

A

E S S A Y S

RELATING TO

A G R I C U L T U R E

AND

R U R A L A F F A I R S .

THE SECOND EDITION,
WITH CORRECTIONS AND ADDITIONS.

BY

JAMES ANDERSON, LL.D.

F. R. S. F. A. S. S.

Honorary Member of the Society of Arts, Agriculture, &c. at Bath; of the Philosophical Society, Manchester; of the Agricultural Society, Altringham; of the Society for promoting Natural History, London; of the Academy of Arts, Sciences, and Belles Lettres, Dijon; of the Royal Society of Agriculture, Peterburgh; of the Philosophical Society, Philadelphia; of the Royal Economical Society, Berlin; Correspondent Member of the Royal Society of Agriculture Paris, and Author of several Performances.

VOLUME THIRD.

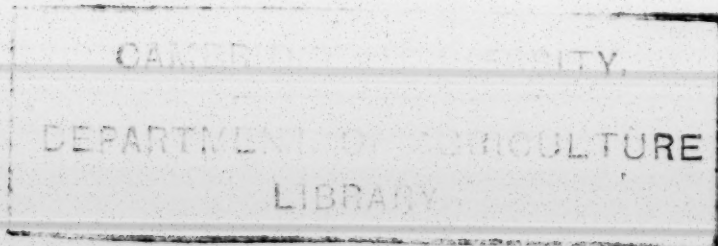
And he gave it for his opinion, that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of Politicians put together.

SWIFT.

LONDON:

PRINTED FOR ROBINSONS, PATERNOSTER-ROW, AND FOR
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1798.



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TO

GEORGE DEMPSTER, ESQ.

WHOSE EXERTIONS IN THE BRITISH PARLIAMENT, FOR UP-
WARDS OF THIRTY YEARS, IN SUPPORT OF THE CLAIMS
OF JUSTICE AND HUMANITY, WILL RENDER HIS
NAME DEAR TO SUCCEEDING AGES,

THIS VOLUME OF ESSAYS

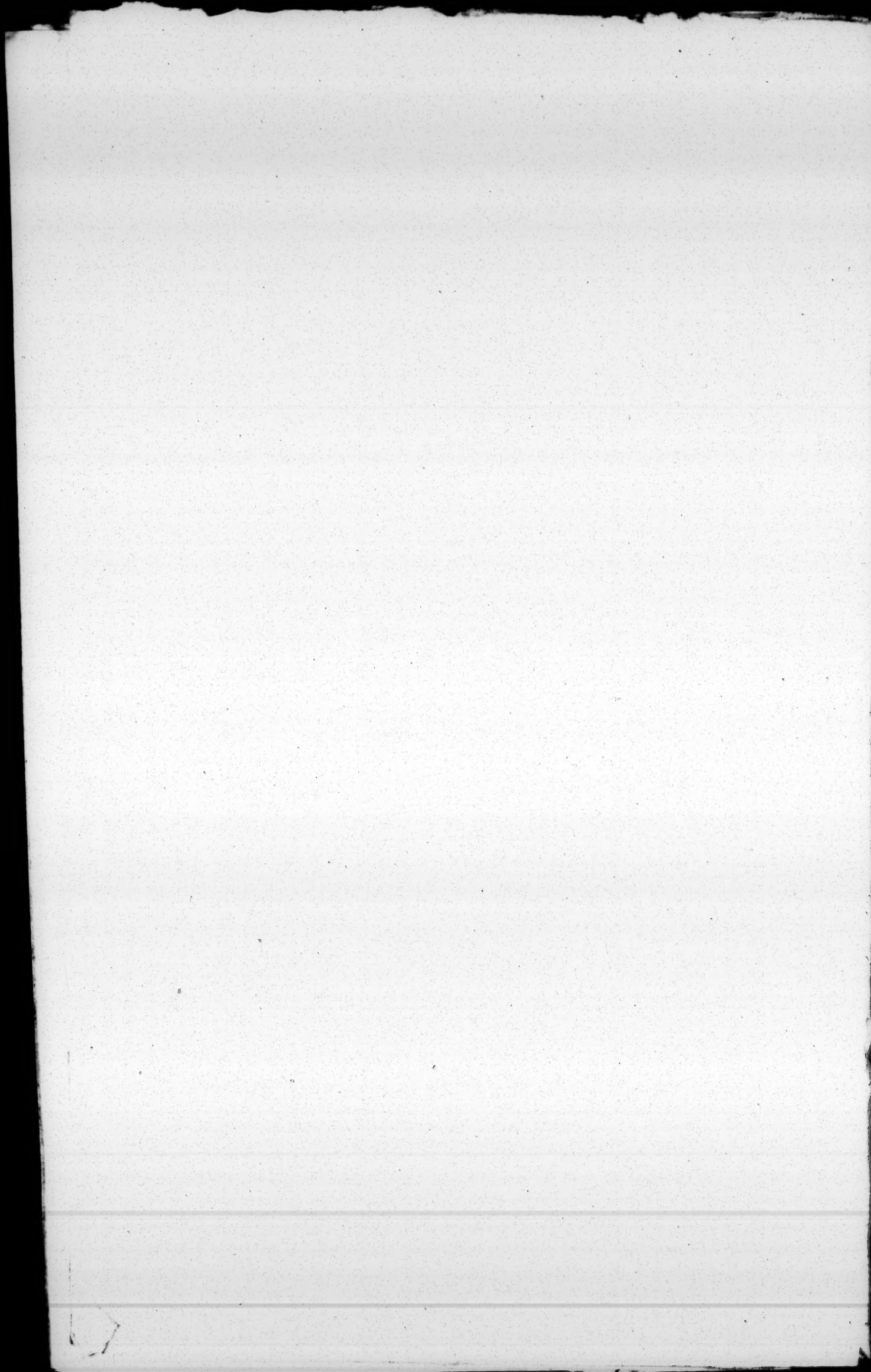
IS,

WITH THE MOST CORDIAL ESTEEM,

RESPECTFULLY INSCRIBED,

BY

THE AUTHOR.



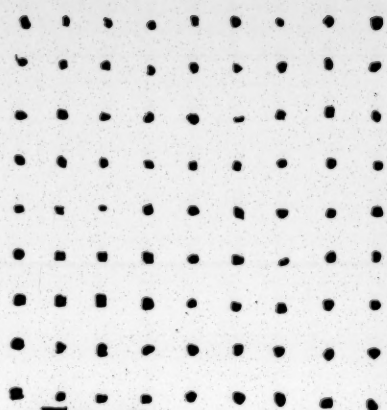


Fig. 5

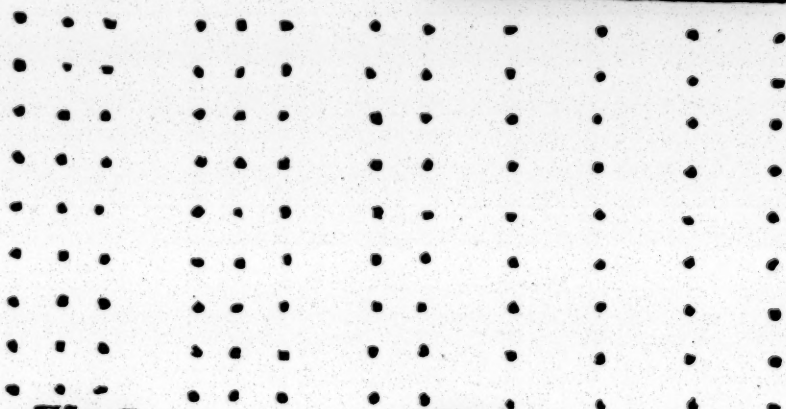


Fig. 6

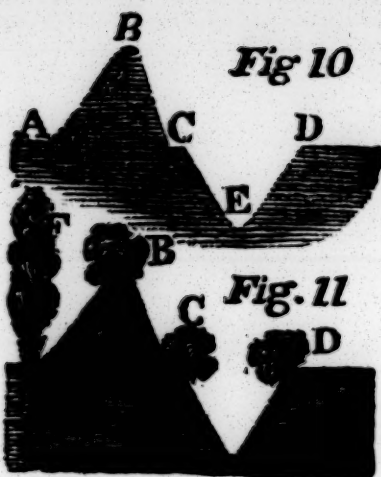


Fig 10

Fig. 11

Fig. 7

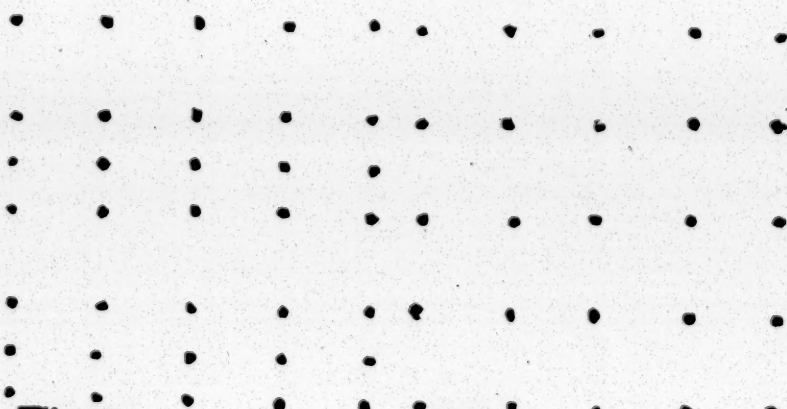


Fig. 8

Fig. 9

[Handwritten mark]

Fig. 2.

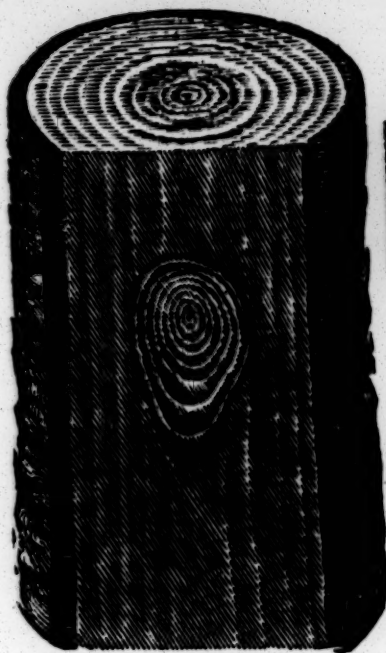


Fig. 1.

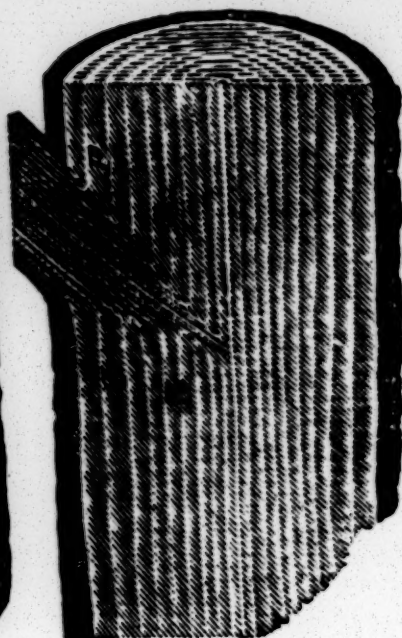


Fig. 3.

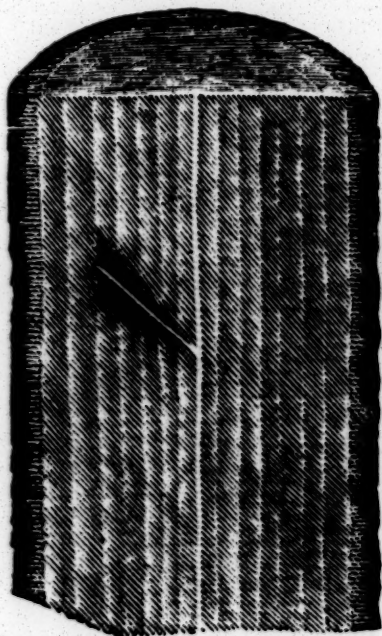
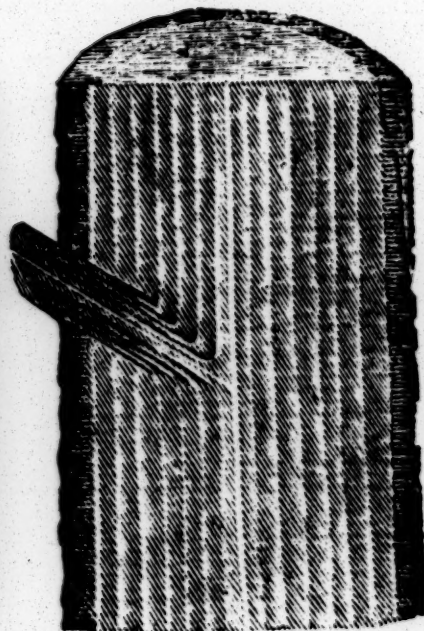


Fig 4.



INTRODUCTION.

THE essays which compose the present volume were written at the request of the president of the board of agriculture, and were intended, with some variations, to form a part of the general report proposed to be laid before parliament by that board ; but were withdrawn by the author, and published in their present form, from the following considerations. When the subject was first mentioned to him, he understood that it was the intention of the board to have every part of that report drawn up by men who had actually practised agriculture *as a business*, each individual being desired to write such parts of it only as he had had occasion to be particularly acquainted with, in the course of his own practice, leaving the other parts to be drawn up by such men as had had more experience in these departments. As this plan appeared to be better calculated to obtain authentic practical information in agriculture, than any other the author had ever seen ; and as he conceived a work of this kind to be much wanted, he readily agreed to lend every assistance

in his power to forward the undertaking ; and set himself with alacrity to write out such parts of it as his own experience best enabled him to do. When he had made a considerable progress in this task, he learnt, with concern, that he had totally misunderstood the meaning of the board of agriculture, in regard to the proposed report ; and that, instead of proceeding, as above stated, and allowing every paper on these subjects to be printed under the eye of the writer, subject to such limitations and corrections only as the board should suggest, and he approve of,—it was intended that these papers should be first circulated among a number of gentlemen, who were to be severally authorised to alter, cancel, or add whatever they thought fit ; and then the work, thus altered, without either the knowledge or the consent of the original writer, was to be published.

No sooner was this understood by the author, than he made haste to inform the president of the board, that, understanding such was the proposed plan of publication, he begged leave to decline having any hand in that work. On being pressed to give his reasons for thus declining, he candidly stated, that as he had never written one line in his life with a view to publication, especially on agricultural subjects, which he could not with

Truth assert had been seriously intended to communicate some information that he deemed useful to the reader, he could by no means consent that any of his agricultural writings should be altered before publication, unless such alterations should be first seen and approved by himself. He knows well, that much harm has been done by theoretical notions having been published under the form of practical directions in agriculture; and had he submitted to the plan proposed, he might have eventually become a sort of accessory in misleading the unwary, instead of guarding them from error, which he hath ever studied to do, with the most cautious circumspection; and from which plan of conduct no consideration on earth shall ever induce him to depart. He may himself, doubtless, like every other man, fall into error, and will be thankful to any one who shall point out such errors, that they may be corrected; but he ever shall study, as he hitherto has done, not only to avoid them himself, but to guard others also against error, as much as is in his power.

The essays thus written were allowed to lie by him for some time, without any thoughts of publication. But when the prices of corn had risen to the alarming height they have now attained,

his attention was turned once more towards them. And as in these essays many of the circumstances, that operate towards diminishing the amount of the agricultural produce of the country, are developed with much precision, he thought no time could be more proper than the present for such a publication: and that indeed the circumstances of the times demanded it.

The author, who now wishes rather to withdraw himself from the busy scenes of life, than to push himself forward in the world, having no pretensions to the character of a fine writer, nor ambition to acquire a reputation of that sort, would make an apology for the language in these essays, if he thought the subject required it; but in matters of this sort refinement of language will not be expected. As his object has ever been rather to inform, than to entertain, his attention has been directed rather to the matter than the form. His chief study has been to acquire so much perspicuity, as that his meaning could not be in any case misunderstood; and to write in such a manner, as tended to induce the reader to attend to facts, and draw the necessary conclusions from them *himself*, as they incidentally may in future occur, rather than implicitly to rely on such casual statements as may fall in his way: and some

peculiarities of manner will be found referable to this head. Indeed, as the chief inducement to his writing at all, was a desire to render some truths, which his own experience hath taught him the importance of, more generally known and adverted to, than they seem hitherto to have been, he sometimes presses these with a degree of earnestness that may lead him, like the Abbé de Saint Pierre, to recur to these subjects oftener than the fastidiousness of modern criticism might judge allowable: like the good Abbé, too, while he is willing to admit, that, if literary fame had been his chief object, the criticism may be just; yet with him, also, the author will be entirely satisfied, if, at the price of reputed inelegance, he shall be able to draw these objects into notice: for as he now looks with a comparative degree of indifference on that kind of literary fame which so much attracts the attention of younger men, and is neither anxious for wealth, nor future aggrandisement, he proceeds in these disquisitions with a steady earnestness, which to those who are accustomed to the writings of men who are actuated by other views, may at times assume somewhat of a harsh and ungracious aspect. He is not conscious, however, of being actuated by the slightest unkind propensity towards any human

being ; and he hopes that, when duly considered, a serious desire to promote the welfare of those who have not adverted so much as he himself has done to the subjects treated, will be found to be the prevailing characteristic of the work. He has stated what he deems important truths with the greater freedom and precision, because he believes that, should he neglect to do it, few others would feel themselves inclined to do so. From this last consideration, he is perhaps better pleased that the publication is in its present form, than if it had been given to the public as was originally intended : for several facts are here stated with less reserve than he fears the board of agriculture would have been willing to allow, if the work had been published under their patronage.

He begs that the reader may understand that the facts alluded to in the following letters, had no share whatever in his determination to withdraw these essays from the board : for it is a truth, that he had intimated such intention to the board, with the reasons for it, before he had any knowledge of the facts which gave rise to the second letter. These letters are here reprinted, merely with a view to vindicate the character of the author from the slur that was apparently thrown upon it by the conduct of the gentleman to whom

INTRODUCTION. xiii

they are addressed, and to prevent that vindication from being overlooked by the readers of these essays. Had it not been for the unfavourable impression that the conduct reprehended in the second of these letters, would have made upon the public mind, in the apprehension of the author and his friends, respecting his character, this last letter would never have been either written or published: but as the evident imputation of the want of *moral rectitude* was public, nothing but a public vindication could be in any degree competent: for the author will never suffer any such imputation to remain unrefuted, in as far as a candid statement of facts can do so, by whomsoever it may be made.

TO SIR JOHN SINCLAIR, BART.
PRESIDENT OF THE BOARD OF AGRICULTURE.

LETTER FIRST.

SIR,

{ *Cotfield, near Edinburgh,*
30th June, 1795.

I USE the freedom to trouble you at present on the subject of draining adopted by Mr. ELKINGTON, not with a view to detract from the merits

of that gentleman, nor to find fault with the remuneration you have obtained for him, but merely to set you right in regard to a matter of fact concerning me, which might easily escape your notice.

I presume, Sir, you thought it evident, from the statement made by Mr. Elkington, that the mode of draining ground which has been so successfully practised of late by that gentleman, was an invention peculiarly his own. That this is not the case, admits of evidence, which I hope you will allow to be satisfactory. It is now twenty years since I published a book, called *Essays relating to agriculture and rural affairs*. If you will take the trouble of turning to the second essay in that work, which is, *on draining bogs and swampy ground*, you will there find the method of draining, by means of *tapping*, which has been adopted by Mr. Elkington, fully explained, and the principles upon which it may be practised clearly developed, by the aid of illustrative figures, discriminating plainly the cases in which that mode of practice would be improper.

I do not understand that Mr. Elkington practised this method of draining before the publication of that work, (*anno* 1775,) neither do I mean to assert that he adopted the practice from the di-

rections here given. I readily admit that the principle is so simple, and so obvious to every considerate mind, that it would certainly be nothing extraordinary, if he, by his own reflections alone, should have discovered it, as well as I did. There is only one particular mode that I myself had not practised before that essay was published, viz. the making the tapping by means of *a boring instrument*; but even this I have particularly described, as you will find in the following words at page 181. (*Third edition, Vol 1.*) of the fore-said essays. After describing the mode of tapping I had adopted, by sinking small pits, and explaining the cases in which it may be successfully practised, it is added, "I have often imagined that the expence of digging these pits might be saved, *by boring a hole through this solid stratum of clay with a wimble (an auger) made on purpose*; but as I have never experienced this, I cannot say whether it would answer the desired end exactly."—Neither can I now say, whether Mr. Elkington grounded his practice on this hint or not; but I may safely say, if he did not, he might have done it: and as I could not have borrowed it from him, if there be any merit in the *discovery*, I have assuredly a just title to claim it.

I wish not to throw out any insinuation to the prejudice of Mr. Elkington, who, by a proper degree of management on his part, has great merit in having turned the attention of the nation towards a mode of draining, which, if the principles upon which it is grounded are fully understood, and properly applied, will be found to be equally cheap and efficacious; as I myself, from an experience of it for more than thirty years, can safely assert. But it is a mistake, to think it can be universally applied. There are many cases in which it can be of no use, and therefore it were vain to attempt it; as I have fully demonstrated in the treatise referred to.

Whether Mr. Elkington did actually discover this mode of draining of himself, or adopted it from the very plain directions given in that treatise, is of little consequence to the public. In either case, he has alike the merit of having introduced it into practice in the southern part of this island: for the simple fact that he has been *supposed* to be the first inventor of it, is the clearest proof that this part of my treatise, *by how many soever it may have been read*, has been allowed to remain, in a great measure, a dead letter, even till the present hour.

INTRODUCTION. xvii

As my intention in publishing that essay, doubtless, was to benefit the public, I owe, perhaps, thanks to Mr. Elkington, for having thus forwarded the design. It is not impossible that the time may not be far distant, when I shall be laid under a similar obligation to some other person, for bringing into practice, *as a new invention*, the mode of embanking rivers, which is described in the essays referred to, with a similar degree of clearness; and which, when reduced into practice, will be an improvement equally cheap and efficacious with the above. An obligation of this sort was conferred upon me, some years ago, without my knowledge of it at the time, by a Mr. BRODIE, I think the name is, when he brought into notice, what he called the *Patent Bath Stove*; the principle upon which that stove is constructed, having been explained, and clearly illustrated by means of a plate in a treatise of mine "On smoky chimneys," that was first published in the year 1769; but this particular was little adverted to for several years, till Mr. Brodie, by a *little proper management*, brought it into notice*. My ideas, freely communicated

* It is generally believed that Mr. Brodie has realized an hundred thousand pounds by this contrivance.

to the public, have been a source of emolument or honour to *others* also. My own reward has been the satisfaction of having done what I know to be right, and the *honour* of being indirectly flattered by compliments that were publicly appropriated to others.

Wishing you success in your laudable undertakings, which, if properly supported, cannot fail to be attended with effects highly beneficial to the nation, I have the honour to be, with due respect,

Sir,

Your most humble Servant,

JAMES ANDERSON.

LETTER SECOND.

TO THE SAME.

SIR,

{ *Cotfield, near Edinburgh,*
 { *10th January, 1796.*

SINCE I had the honour of addressing you in public on the subject of draining land, I have learnt that a controversy has been carried on in the newspapers to some length, upon the same subject, by various persons. Who these persons are, I know not; and with the particular object each

party has in view, I am in a great measure unacquainted. I never saw one of these publications except two, which accidentally fell into my hands in September last, when I passed through London. The present letter, therefore, must be considered as having no connection with, or reference to these publications; and if any thing shall here occur that shall tend either to corroborate or oppose any of these writings, it must be considered as merely accidental.

Since my own letter above alluded to was written, I have seen two publications by the president of the board of agriculture, in which the draining of land has been mentioned. The first is an address to the board of agriculture, dated 14th July, 1795, in which it is taken notice of in these words: "The board has succeeded in it's first application [*i. e.* to parliament for a reward on account of *discoveries* advantageous to agriculture,] in behalf of a very deserving individual, "Mr. Joseph Elkington, *who has carried the* "art of draining to a perfection hitherto unknown." The second is an address to the board of agriculture, on the cultivation and improvement of waste lands of *Great Britain* by the president, printed 23d December, 1795, in these words: "A considerable proportion of the

“ wastes of Great Britain consists of lands of a
“ wet and boggy nature, which it has yet been
“ supposed was the most difficult to improve and
“ cultivate. Fortunately, however, *discoveries*
“ have been made in the art of draining bogs by
“ Mr. Joseph Elkington, a farmer of the county
“ of Warwick, as renders the improvement of
“ swampy land a matter of much less difficulty
“ or expence than formerly.” My friends think
that in both these passages there is manifestly a
marked determination to set aside my claim to
any share in the discovery of that mode of drain-
ing, and a studied care to avoid my name in any
way, lest it might imply some sort of derogation
from the merit of Mr. Elkington; and they far-
ther think, that after the public claim I have al-
ready made to that discovery, it would argue little
less than a consciousness of the injustice of my
claim, should I suffer such a public affront to pass
unnoticed. As some of Sir *John Sinclair's* best
friends, with whom I have spoken upon the sub-
ject, concur in the same opinion, I find myself
called upon to urge a farther explanation on that
head; which is one of the principal objects of the
present address.

The question at issue may be reduced to a
very narrow point, which is this. The practice

of Mr. Elkington is, in it's principle, either the same with that which was practised by me, more than thirty years ago, and published as above said; or it is not. If it be the same, then doubtless Mr. Elkington can have no just title to be held out to public view *exclusively* as the *discoverer* of this practice; for I presume, he will not alledge that, at the time of the discovery, I had ever heard of him or of his practice. Indeed, I never did hear of either, till his name was first mentioned in some of the publications of the board of agriculture. On the contrary, as it is certain, that my discovery was published more than twenty years ago, and that Mr. Elkington has never till this hour published his, but has been going on from imperfect beginnings, gradually improving as he went on, it is not so clear that he may not have borrowed some hints to direct his practice, either directly from my treatise, which has been pretty generally read in Lancashire, or from the conversation of some persons who had read it. From these considerations, if the principle be the same, it will be difficult for the president of the board of agriculture to [clear himself from the imputation of a marked partiality in the passages above quoted; especially after my having pointed out to him, in my former letter,

the passages in my essays that directed the same method of practice so long ago as has been already specified. If, on the other hand, the practice followed by Mr. Elkington differs in principle from that which I had so long ago explained; in that case the president of the board of agriculture may be with reason accused of injustice to the public, by having delayed so long to explain the principle of that useful discovery; for, as the public have already paid for the discovery, they have a right to demand that it should be made more generally known for the benefit of the whole community; in the same manner as Mr. Forsyth's receipt for recovering decayed trees was published, on receiving his premium. [I understand that I have been here misinformed—a part only of that premium having been as yet paid, April 15, 1798.] I therefore, in the name of the public, demand of you, Sir, who have taken the lead in this transaction, to publish this secret, that all the world may be enabled to know it, and to avail themselves of it, if they incline, without being obliged to have recourse to Mr. Elkington himself, who, in this instance, like the venders of quack medicines, carefully conceals his secret, that he may be enabled to profit by the credulity of the public. And shall the

president of the board of agriculture demean himself so far as to give countenance to such transactions!!!—I will not suppose that such can be the case. Yet appearances are against you.—Inadvertence may have led you to adopt a language that is fairly susceptible of that interpretation; and you cannot take too early an opportunity of doing it away.

It will be the easiest thing imaginable for Sir John Sinclair to clear himself from this charge, and settle the matter,—simply by publishing the principles on which Mr. Elkington's method of draining is founded. This can be attended with little trouble:—For as Sir John must fully understand the principle himself, (otherwise it would be an insult to suppose he could have used a language so strong and decisive as he has done)—he can find little difficulty in explaining it, as a supplement to one of those publications that are every day issuing from the press, at the expence of the board of agriculture.

Such a publication is likewise necessary on Mr. Elkington's account, if he means to free himself from the imputation of quackery; which idea, the manner in which he has been introduced to public notice by the board of agriculture, has a strong tendency to countenance. This ought to

be done away, if he wishes to gain that respectability of character to which superior talents should naturally entitle him. With such men, *candour* is ever a leading characteristic feature; for, however far concealment and deception may lead to emolument in certain cases, it never can be accounted honourable. Now, if Mr. Elkington be sensible that he understands the principles upon which his practice is grounded, so completely as to be able to explain it in such a satisfactory manner, as to set at defiance the critiques of philosophical investigators, he can have no objection to publish it. He has received a price for it; and not only honour calls for it, but *justice* requires it at his hand. If neither the president, nor any other member of the board of agriculture, nor Mr. Elkington himself, shall, after being thus called upon, publish the secret that he has sold, the public will be disposed to believe that Mr. Elkington cannot do it, and that he has availed himself of the influence of some great man, to impose upon the president and the board of agriculture; who have thus, in their turn, been induced to lend their aid to enable him to dispose of his nostrum to the best advantage. From these considerations, it alike behoves the president, the board of agriculture, and Mr. Elkington him-

self, to lose no time in publishing his secret. Among other good effects that will result from this measure, it will totally preclude all farther altercation respecting the merit of this discovery, between him and myself, or others.

Till such publication appears, it may not be improper in me to observe, that another body of men, who have had good opportunities of information, have thought proper to adopt a conduct respecting this particular, very different from that of the president of the board of agriculture. The gentlemen who compose the society of agriculture at Altringham, near Manchester, in the county of Lancaster, having determined to encourage the draining of land by means of tapping, judged that a respect for their character required them, in this case, to act with the strictest impartiality: and thinking it would be of use to those who were to attempt it to know the principle on which success depended, as well as the mechanical practice of the art, the society offered a premium to those who drained the greatest quantity of land according to the practice followed by Mr. Elkington, on the principles explained by Dr. Anderson, in a book called essays relating to agriculture and rural affairs.

The following is Mr. Elkington's own account of the way in which he was first led into the train of discovering this mode of draining by means of tapping, as it was told to me by a gentleman of great veracity, who had it from Mr. Elkington himself; and it appears to be so natural, as fully convinces me that it is strictly the truth. Mr. Elkington's father having died about the year 1763, left him in possession of a small farm of wet four land. He found that no good could be made of it without previous draining. He accordingly set to work to drain it in the usual way; but after having laid out as much money as his narrow funds could afford, he had the mortification to find that no benefit had resulted from his labour; which tended very much to discourage him. While he was in a state of despondency on this account, he, by accident, dug a little deeper than usual in one of his drains, and found, to his great surprise, that a copious spring of water burst forth from the hole, which continued to flow with a plentiful stream for a very long period of time. He dug deeper in several other places with the same effect, though the streams were less copious than the first. In consequence of these openings, he had the satisfaction to perceive that his fields gradually became drier and drier,

till they at last were perfectly freed by it from all the superfluous moisture. And not only were his own fields thus drained, but the contiguous land, for a considerable distance all round, was made drier also by the operation. This circumstance led him to suspect, that in other cases, where the surface-appearance of wet land was somewhat similar to his own, they might be drained by making openings resembling those above named. Success attended his operations in many cases; and he gradually went on in his practice, correcting his first errors by experience, and improving upon it till the present time.

From this account, it would seem that the discovery was, as to him, merely accidental; nor does it appear, from the above, that he had any clear idea of the manner in which the draining is thus effected, or the principles on which it depends, so as to be able to distinguish, *a priori*, those cases in which that mode of draining could be of no use, from those where it must of necessity prove efficacious.

As to myself, the discovery of that mode of draining was made in the following manner: I had a field of wet land that lay very flat, but so surrounded by ditches, that no surface water could come to it from higher ground any where,

and possessing at the same time such a level as to prevent any water from necessarily stagnating upon it. The field was so wet, that in many places it was a mere hobbling bog, over which a man could scarcely pass during the driest weather in summer. This was a very unprofitable as well as disgusting object; and, in the beginning of the year 1764, I set about seriously to have it drained. On considering the circumstances of the case with attention, I soon perceived, that as no *surface* water could come upon it from the higher ground; and as the rain that fell upon the field itself was suffered freely to run off, the water that drowned it must rise up from *below*. But as the weight of the atmosphere acted on this field as well as on those around, the water could not be made to ascend, as in a pump, by means of suction: it must, then, be forced to take that direction in consequence of some powerful pressure from below ground, acting so strongly as to overcome it's natural gravity. This pressure, it was evident, could only be in consequence of the water flowing from higher ground, *under the surface*, through a stratum of pervious matter, being pent in near the bottom by a stratum of clay placed above it, and thus forced to rise to a higher level than the low ground, in this

kind of subterraneous canal, so as, by the natural power of gravity, to be squeezed forcibly through small fissures in the superior stratum of clay. If so, it would necessarily follow, that should a hole be dug through the superincumbent stratum of clay, so as to reach the bed of the reservoir, the water would be allowed to issue freely through that opening, and to run off the ground by its natural level; and thus would the accumulated water, which occasioned the pressure, be gradually discharged, after which it could no longer be forced up through the small fissures in the clay; and, of course, the wetness, that had arisen solely from that cause, must be gradually removed. On this reasoning, which seemed perfectly conclusive, and which was confirmed by observing that the subsoil of that field was every where a very stiff clay, mixed with small stones, the dry weather was no sooner set in, than I put a man to dig a pit as near to the edge of the swaggle as he could approach, ordering him to penetrate directly downwards, making the pit no larger than was sufficient to allow him to work, and to proceed without interruption, until he should perceive that, on making his strokes, it should sound as if it were somewhat hollow below. On observing this, he was desired immediately to desist, until

he called me and received farther orders. The labourer accordingly fell to work ; but he found the ground so hard, that, in the course of two days, he had only penetrated to the depth of about five feet. During that time I frequently visited the work, to examine appearances. Nothing remarkable occurred, save that little peering springs often were discovered, through which the water issued ; but the quantity of water that came from them was not such as to interrupt the work. On the morning of the third day, about breakfast time, the labourer called on me, and said, that as his stroke gave a *douf sound*, (that was his phrase,) he had called me according to my desire. I went immediately with him to the place, and having made him go down into the pit, I desired him to show me in what manner he could come out of it. He then pointed out to me a kind of steps he had made into the clay on one side ; and having lent him my hand to assist him, I found he could get out very quickly. I then ordered him to take a kind of sharp pointed iron crow, with a cross handle and foot to it, which he had found a very useful tool in loosening the clay, and give a stroke of that with all his force upon the bottom, which he did.—On this, to his great surprise, the tool penetrated a thin

crust, and then fell down from one to two feet, as in a vacuity. Through the opening thus made, a strong jet of water rushed instantly with great impetuosity; but I, being aware of it, and at hand to assist the man in mounting, he got very quickly to the surface, and out of all danger, though not a little terrified at what had happened. The stream was at first so large, as might, I suppose, have filled a pipe of from 6 to 12 inches diameter; and rose as a *jet d'eau*, to the height of six feet, at least, above the surface of the ground. The labourer, who had no idea of such a phenomenon, looked upon it with an overpowering astonishment, which would have furnished a fine subject for the painter. The stream continued to flow, and to rise above the surface of the ground for about a week; but gradually abated in height, till it arose not above the surface of the ground, and continued still to flow; but the quantity of water gradually diminished, till it at last settled into a perennial spring, which continues to run till the present day.

The consequence of this operation was, that during the course of the ensuing summer, the water gradually drained off from the boggy ground; the swaggle slowly acquired a firm surface, so as to admit of being ploughed at any sea-

son; and about twenty acres of ground were thereby drained, which, before that time, had been in a great measure useless for every agricultural purpose.

Ten years afterwards, being about to publish an essay, containing directions for draining all the different kinds of wet grounds that occasionally prove detrimental to the farmer, I naturally specified this variety of wet ground among the others, and gave a plate explanatory of the cause of that phenomenon, as I had done of the others, in order that every person, who chose it, might be enabled to distinguish the case, and apply the remedy himself, if he so inclined. The essay has been now in the hands of the public above twenty years, and will speak for itself; so that more need not be said here on that head, further than that all these facts could be *proved*, were it thought necessary to do so.

I may add, however, at present, when I find that a disposition is manifested, on some occasions, to withhold honour from those to whom honour is due, that though I did not think it proper, in a work that professedly treated of agricultural concerns only, to specify all the useful corollaries that might be drawn from the physical appearance above explained, I may now, without any

INTRODUCTION. xxxiii

impropriety, barely mention, that from the application of this principle, many phenomena may be explained in a very satisfactory manner, which have been hitherto reckoned cases of great difficulty. Some of these, (particularly in the case of a well that was sunk at Tilbury Fort, on the Thames, as narrated in the Phil. Tran. Vol. in which an abundant spring of *fresh* water was found, at a great depth below the surface of the sea, after two springs of *salt* water had been passed through above it,) I pointed out, in a letter I did myself the honour to write, several months ago, to Leigh Philips, Esq. of Manchester, who had been kind enough to say that the essay referred to was what he conceived to be a *complete system of draining*. This expression induced me to show him it could not be deemed *complete*; as several cases were omitted, which I then specified to him: among others, it was shown that deep lakes, surrounded by mountains of great height on all sides, may, on some occasions, be entirely drained, by *boring*, or sinking shafts downwards, sometimes to a moderate depth: that also wet land may, on some occasions, be more easily drained, by opening an outlet for the water *beneath* the reservoir which occasions the wet, than by bringing it up to the surface. And that, among moun-

tains, it may frequently be much cheaper to carry off superfluous water from mines, by penetrating downwards, than by driving a horizontal level to the surface of the ground, which is in many cases attended with a ruinous expence. These corollaries are indeed so obvious, when the principle is once explained, that it must appear astonishing to any considerate mind they have not been made, and very generally applied in practical cases, long before the present period; and I here specify them, merely to direct the attention of men to an object from which much practical good may be derived, in a variety of cases, which it would be tiresome in me here to enumerate.

I have farther to add on this head, that there is one variety of wet ground which had totally escaped my notice in that essay, and which has not, that I know of, been treated of by any writer on agriculture; though it is, perhaps, more universally hurtful to the farmer, than any other kind of wet land whatever. This I have occasion particularly to explain, in the second essay of the present work, on the improvement of waste lands.

From the facts that were stated in the committee of the board of agriculture, in favour of Mr. Elkington's mode of draining, as published in

their *report*, dated June 15th, 1795, there seems to be reason to suspect, that Mr. Elkington himself, even at that period, was not fully aware of all the circumstances that were essential to the practice of draining ground, in the most economical manner, by means of tapping;—as the labour and expences incurred in many of the cases there specified, seem to be much greater than that mode of draining, judiciously applied, could possibly have required. But as these cases are stated by gentlemen who did not themselves fully understand this method, they may possibly have been done with some degree of inaccuracy. When Mr. Elkington himself shall publish his own method, that doubt will be removed; and every individual will then be able to judge for himself as to this particular. If his practice be as good as it is said to be, it cannot be too soon or too generally made known. If it shall be defective in any respect, these defects cannot be too soon pointed out and rectified; which would probably not be long delayed after the publication required.

I shall be sorry, if, in consequence of the precipitate conduct of Mr. Elkington's friends, I have been obliged, for the purpose of obtaining impartial justice, to say any thing here that may tend to prove in the smallest degree detri-

mental to that gentleman. I look upon him as a very worthy member of society; and I believe him to be an honest man. I have not a doubt that his practice has already been of much national utility, and will be of still more, the wider it is diffused; even although it should not be carried on in the most perfect manner of which it will be found to be ultimately susceptible; and I can assure that gentleman, with much sincerity, that there is not a man in the land, not the president of the board of agriculture himself, nor his still more powerful patron, who will rejoice more in his prosperity than myself; or who would more gladly lend his aid to the extending his practice as wide, and the rendering it as perfect, as possible. It is perhaps unfortunate, when a plain man finds himself forced to come forward in the genteel circle,—especially where such person may, by the ill judging partiality of ignorant friends, be induced, from the hope of benefiting his family, to acquiesce in statements that he himself would never, perhaps, have made,—even though he be backed by those who have the most powerful influence. For it is not in this nation that influence can altogether suppress the voice of reason, or ward off entirely the severity of reprimand.

INTRODUCTION. xxxvii

mand, when the insolence of supposed power provokes a scrutinising enquiry.

I have now, Sir, done with the business of Mr. Elkington, but am sorry that, in justice to myself, I am not yet at liberty to put an end to this, I fear, ungracious epistle.

It appears to me very strange, that I should have occasion, at one time, to complain of having been ill used in *two* respects, by Sir John Sinclair, as I am not conscious of ever having merited any thing of that sort at his hand, *but much the reverse*. It unluckily happens to be so, however, at present. The trespass, too, is of such a kind, as to require that notice should be taken of it in the public manner I now do, in order that I may remove, in part at least, the injury that, by his improper conduct, must have been done to my character. I shall briefly state the facts, for the justness of which statement I appeal to yourself.

Immediately on receiving a letter from the president of the board of agriculture, in February last, requesting that I would favour the board with any information I could give respecting the culture and uses of potatoes; I sat down, and in great haste put upon paper such observations as occurred to me at the moment. These observa-

tions, without revifal or corrections, were instantly forwarded to the board, under cover, addreffed to the prefident, and were accompanied by a letter, ftating that I had loft no time in complying with the wilhes of the board refpecting the fubject of potatoes, and that the papers which accompanied that letter, contained what appeared neceffary for me to fay on that head. But I added, that thefe remarks were intended folely for the ufe of the members of the board itfelf, and “were not intended to be *published*.” This I forbade in the moft pofitive manner; and even requested that the board would be fo kind as not to mention my name in any publication they might think proper to make on that fubject; defiring that the papers might be returned to me after the members of the board had fatisfied themfelves with regard to them. So anxious was I that this requifition fhould not be forgotten, that I mentioned it no lefs than three times, in as many different letters I had afterwards occafion to write to Sir John Sinclair; and as the franks had been reduced in weight before the laft letter was written, I defired him, with a view to avoid the trouble of addreffing fo many covers as it would then require, to fend the M. S. to my fon in London, who would take care to get it

forwarded to me. After all this the reader will judge of my surprise, when I read these words in a letter from Sir John: "The board has at length finished it's publication on the subject of potatoes; *and as you have been a contributor to it*, you are entitled to a copy of it." In what manner I had become a contributor to that work, I could not well conceive; for I did not then imagine that ever he could think of publishing what I had so positively forbidden: but as some observations of mine on potatoes had been printed in other publications, I thought something might have been extracted from these works, to which this passage might allude. I took the earliest opportunity that offered, to consult that work for my own satisfaction. My astonishment at seeing the observations printed entire, with all their faults, and others superadded, thus forced upon the public notice, "unanointed, unanelled;" and the indignation I felt at this unexpected insult, may be easier conceived than expressed. I call it an insult, because I conceive that no one, acting in the character of a gentleman, can have a right to publish the writings of another, even without his consent, far less, if contrary to his express injunctions, clearly announced, and repeatedly enforced. You, Sir John, have it in your

power, by publishing my letter, to correct me if I misrepresent the fact. If I have stated it justly, it is incumbent upon you to make such an apology as one gentleman ought to give, and another to receive.

What adds *injury* to the *insult*, on the present occasion, is, that from the whole tenor of the writing, it was obviously intended for private information only, and not at all for the public use; and if you had taken the trouble to read, with an ordinary degree of attention, the first sentence only, you could not have failed to perceive it. You need scarcely be told it may be extremely proper to express in a particular way, what was obviously calculated for the private perusal of a few gentlemen only, who were about to judge of matters that were not within the sphere of their observation, though it would be exceedingly preposterous to make use of the same expressions, when intended to be laid before the best informed professional men in the kingdom. The observations which, in the one case, would only be calculated to induce that cautious circumspection which men of professional knowledge in any line, are in some measure required to use, when called upon to assist those of less experience, whose situation in life incidentally may bring them to de-

cide in matters respecting that profession; but, in the other case, as being addressed to professional men, many of whom may be supposed to be equally well informed as the writer himself, could be considered as little better than an insult, and would indicate an overweening presumption in the writer, that could only excite disgust and contempt. Such, in fact, is precisely the case in the present instance; and the words of the introductory paragraph to that essay, if they were supposed to be intended for publication, can only be calculated to make an impression on the mind of every reader that is very little in favour of the writer; and what I conceive to be extremely different from what my own character, if not obscured under such an humiliating disguise, ought naturally to produce. I feel, at least, that if any other person had written such a paragraph, intending it to be published, as this has been, I should have despised him as an impudent coxcomb, whom it would be a merit to humble. Sir John Sinclair is as capable as any man of judging of the irresistible effects of such impressions on the public mind: nor would there have been any thing extraordinary in it, if he had, on receiving such a paragraph for publication, from a man with whom he was in habits of intimacy,

requested him to reconsider it, to see how far he thought it proper for the public eye, on the supposition that it had escaped his notice through inadvertency. But to publish it in that imperfect state, though contrary to the express orders of the writer, repeatedly enforced, without giving him even a hint of such an intention, was using a freedom which no man, whatever his situation in life may be, has a right to take with another. The law has provided a punishment for him who injures his neighbour's good name. The injury may be as great when it is done in this way as any other, though it has, perhaps, hitherto escaped the notice of legislators. With those who shall read this letter, perhaps *a part* of the injury may be done away; but Sir John ought to consider that thousands may have seen the publication alluded to, who may never have an opportunity of reading this, and that the writer must continue to be despised by them till the end of time.

Besides the circumstance above alluded to, there are other blameable particulars originating from the publication of that performance by the board of agriculture, that must affect the character of the writer; for so little attention has been paid to the printing, that, from the incorrectness

of the prefs, he must, in some cases, appear to write in a manner altogether unintelligibly, and in others, he is made to speak perfect nonsense *. I will not say that these things were intended: but is it fit that one person should suffer a material injury, through the carelessness of another; especially when that is produced, not in the ordinary course of business, but is occasioned entirely by the culpable forwardness of that person?

I am happy at being now come nearly to the close of a letter, the writing of which has been to me a very unpleasing task; for I mean not to bring forward any other complaints against you at this time; and hope I never shall be forced to do so, at any future period. I do not take pleasure in finding fault; and in few cases could it prove more irksome to me than the present. Anxious as I have been, through the whole course of my life, to see the prosperity of this country

* **EXAMPLES.** I had said, 'But now that *fresh* kinds are obtained from *seeds*,' which is printed, 'But now *the* fresh kinds are obtained from *reds*,' I had said, 'Nor are those kinds that send their bulbs deep in the ground, so *desirable* as those that rise upwards,' which is printed, 'So *durable* as those that rise upwards.' I had said, that 'in a rich mellow soil the roots would be able to strike with ease, and *find* abundant nourishment;' it is printed, 'And *send* abundant nourishment.'

augmented, by promoting the peaceful exertions of rural industry, and thus preserving the morals of the people untainted, the only sure basis of national welfare, I cannot but feel a sensible regret at any degradation of the character of the man who has taken the lead, for the present, in that laudable undertaking. Undoubtedly nothing tends so much to exalt a man's character, and to give him superior weight on all occasions among his equals, as that unbiaſſed integrity, which, riſing above thoſe partialities and prejudices that are inſeparable from little minds, preſſes ſteadily forward in it's courſe, without wavering, however aſſailed by the tempting lures that may be held out to it, on either hand by the artful and deſigning. It was this that raiſed Ariſtides, the Athenian, to that exalted pre-eminence that ſuppreſſed even competition itſelf, and gave him ſingly the power of adjusting the claims of rival ſtates. Such a character commands reſpect, even where talents are rather defective; and will make errors themſelves be overlooked by moſt men: but where this divine attribute is wanting, the moſt brilliant talents diſplay their luſtre in vain; and even the moſt uſeful purſuits, by ſuch men, are fruſtrated. I have been hurt, Sir John, at the obvious partiality of

your conduct towards myself, and the apparent design, unfairly, to lessen my character with the public. Should a similar weakness, to use the mildest expression, be perceived in regard to others, the influence of the board of agriculture must soon be lost with the public. It will only be then viewed as one of those tiny institutions that are calculated to soothe the vanity, or to augment the political influence of certain individuals for the time. I most anxiously wish that this may never be the case; and shall only add, that if any thing I have here said, shall, by inducing a little more circumspection, where the reputation or the interest of others may be affected by any casual inattention on his part, tend to render the character of Sir John Sinclair still more respectable than it has hitherto been, it will add to the pleasure and happiness of,

SIR,

Your very sincere well-wisher,

JAMES ANDERSON.

*ADDITION made to the second edition of this volume of the essays,
April, 1798.*

SINCE the former edition of this volume was printed, a publication by the board of agriculture has appeared, said to contain an explanation of the principles of Mr. Elkington's mode of draining, which is inserted in the first volume (page 20) of the 4th edition of these essays, with remarks upon it, to which the reader is referred.

Dr. ANDERSON thinks himself singularly unfortunate in having occasion to complain of such repeated acts of injustice done to him by Sir John Sinclair. He should not, however, have troubled the public in consequence of this injury he is now about to state, had it respected himself alone; but as it tends to affect the memory of a man to whom he lies under the greatest obligations, and for whose memory he bears the most respectful veneration, no consideration whatever can prevail with him to become as it were a silent accomplice to a deed which tends to wound his reputation in the most insidious manner. These considerations induced him to publish the following advertisement in the Morning Chronicle, for March 25th 1797; to which he has not as yet seen any answer. He now reprints it, to give it the greater degree of publicity, till he should more deliberately determine what farther steps will be necessary completely to effect the purpose of rescuing the memory of Dr. Cullen from the injury it has thus sustained.

ADVERTISEMENT.

“ We are authorised by Dr. Anderson, to inform the public, that a paper which has been printed and circulated by the board of agriculture, purporting to be written by the late Dr. Cullen, of

INTRODUCTION. xlvii

Edinburgh, and commented upon as a genuine performance of that eminent man, is not a work of Dr. Cullen, who never wrote or corrected one syllable of it; that every word of that paper was written by Dr. James Anderson, being the substance of very imperfect notes taken by him, while yet a boy of little more than fifteen years of age, from the extempore discourses of Dr. Cullen, which was his first attempt to take notes of any kind. Conscious of the extreme inaccuracy of these notes, the pupil took care not only to mark the particular in the very title, by the words, "*errores sunt discipuli*," but also to state it more clearly in a short advertisement prefixed, (all of which have been suppressed in the printed copy) warning every person into whose hands it might fall, not to suffer the errors of the pupil to injure the character of the preceptor; but he farther took care never since to allow the MS. to be out of his possession, unless to two of Dr. Cullen's sons alone, to whom he lent it under the strictest injunctions, not to allow it to be seen or copied by any person whatever. Sir John Sinclair having heard that this MS. was in the possession of Mr. Cullen (now Lord Cullen) applied to that gentleman, through various channels, for permission to take a copy of it, which he positively refused to do, or to give his consent to its being published, could a copy of it be even obtained. Sir John afterwards, however, found means (which it is supposed he does not desire to have publicly developed) to obtain a copy of that MS. and immediately published it, to the no small astonishment of Mr. Cullen, as well as to that of the owner of the MS. No sooner did Mr. Anderson see a copy of that publication, and came to an explanation with Mr. Cullen on the subject, than he stated his claim to the MS. in a letter to Sir John Sinclair, and soon after to the board of agriculture also, requiring that a farther publication of it might be stopped, as being his own private property; and also, with a view to do justice to the character of Dr. Cullen, requested

that the board would be pleased to make some public intimation of the mistake it had inadvertently fallen into in ascribing it to him. This the board at last declined to do, in consequence of which this short statement of facts is made public, in the mean time, till more effectual means for obtaining redress be adopted.

It was once intended to have noticed, among the obstructions to agriculture, in the first essay, the speculations of literary men, and the attempts of men of great wealth and property, to practise agriculture; as also books of agriculture, of a certain description: but to free these propositions from the appearance of paradox, would have required so many explanations, and exceptions, that it was judged more expedient to omit them entirely. They are mentioned here only that practical farmers, in whose eyes these must often appear to be great and evident obstructions, may see they were not entirely overlooked by the author.

ESSAY FIRST.

§ I. Commonable lands considered as an obstruction to	Page.
agriculture	7
II. Commons	21
III. The minute division of property	46
IV. Intermixture of property	50
V. Mills	53
Thirlage.	60
VI. Farms, of a size inadequate to the circumstances in which they are placed	62
VII. Inadequate security of tenure, improper conditions under which that tenure has been granted, and restrictive clauses in leases	71
Lord Kaims's leases	86
VIII. Want of capital among farmers	96
IX. Inclosures injudiciously made	106
X. Church lands, lands in mortmain and entails	113
XI. Indefinite claims upon land	121
Tithes, considered as they affect	
1 The farmer	123
2. Proprietor	130

CONTENTS.

	<i>Page.</i>
— 3. <i>Tithe owner and impropriator</i>	133
— 4. <i>The public</i>	139
<i>Plan for commuting the tithes</i>	140
<i>Poors rates</i>	152
XII. Want of easy means of communication	167
XIII. Want of markets, as affecting	
— 1 st , <i>a corn farm</i>	168
— or, 2 ^d , <i>a grass farm</i>	174
XIV. Injudicious fiscal regulations	176
<i>The salt laws</i>	176
<i>Laws of parish settlements</i>	181
<i>Wool laws</i>	181
<i>Corn laws. vide Postscript</i>	
XV. Want of means of circulating agricultural knowledge among farmers	182

ESSAY SECOND.

ON WASTE LANDS, AND THE MEANS OF THEIR IMPROVE-
MENT

195

PART FIRST.

ON THE IMPROVEMENT OF WASTE LANDS BY MEANS OF CUL-
TURE

195

§ I. Preliminary observations on the circumstances that
require to be adverted to before the cultivation of
waste lands should be attempted — 196

The neighbourhood of great towns peculiarly favour-
able for the improvement of wastes — — 202

CONTENTS.

li

	<i>Page.</i>
No expence should be incurred but that which tends to remove <i>physical</i> obstructions only —	204
No share of the profit arising from the improvement of wastes should be abstracted from the undertaker	206
Agricultural enterprises in England less profitable than those in trade or manufactures — —	208
Difference between England and Scotland in regard to agricultural enterprises — — —	209
The cultivation of wastes a sort of business of Scotland	211
Illustrated by a practical example —	212
Land to be appropriated in lieu of tithes considered	215
The improvement of waste lands should be conducted by actual farmers — — —	217
Apathy of farmers, circumstances which occasion it	218
Insecurity of tenure stops the improvement of wastes	219
Inclosed lands may sometimes be called wastes —	221
Necessity of adverting to the foregoing circumstances	223
 § II. Practical directions for bringing waste lands into cultivation — — —	 225
<i>1st, As connected with a cultivated farm</i> — —	225
How to bring waste lands as soon as possible into the state of profitable grass lands — —	227
The necessity of not attempting to do too much incultivated — — —	228
Lime the most universal manure for unproductive land	229
Dung ought not to be conjoined with lime —	231
Newly broke up land should be kept under tillage	232
Summer fallowing, uses of it — —	233
Deep stirring of the soil, importance of —	234
Trenching, its utility — — —	234
The miner, an implement so called, its uses —	235
A particular kind of wet soils, how to drain and cultivate	236
Deep ploughing on ordinary occasions, not necessary	241
Lime ought to be spread while in a dry powdery state	242
Turnip a proper crop for unmellowed soils —	243
Turnips should be sown early — —	244
Two crops of turnips may be taken in succession	245
Pease of vetches may be sown on stiff soils —	245

CONTENTS.

	<i>Page.</i>
Oats succeed well on crude soils — —	246
Grass seeds should be sown with the first corn crop	247
Rye-grasses recommended — —	249
Burn-beaking, cases in which it may be successfully adopted	250
Burning does not consume the soil —	251
The <i>surface</i> only may be burned, though the soil be deep ploughed — — —	253
Burning old corn land may prove hurtful —	254
Burning mossy soil a dangerous practice —	256
Stiff clayey soils difficult to be brought into cultivation	258
The expence of cultivating such soils often prove ruinous	258
<i>ad, On the cultivation of waste land as not connected with a farm</i>	261
Temporary measures necessary to be adopted at the be- ginning of such operations — — —	261
The natural produce of waste lands consumed by sheep	263
The dung of these sheep a source of improvement	264
Lime should be conjoined with it —	267
Folding of sheep, mode of conducting it —	269
Permanent inclosures not here necessary —	274
Divided commons often come under this class of wastes	275
Lime applied to the surface of grass land, how to be managed — — — —	277
Irrigations slightly noticed — —	279
Inclosures circumstances that render them unnecessary	280

PART SECOND.

ON THE IMPROVEMENT OF WASTE LANDS, BY PLANTING TREES	282
§ I. General remarks on the different kinds of trees that may be planted on wastes — — —	283
§ II. Of fir plantations in particular — — —	286
Price at which a plantation of firs can be made in Scot- land — — — —	290
On bleak exposures, which kind thrives best —	291

CONTENTS.

liii

	Page.
Firs ought to be planted out while very young	292
The leaves and branches of the fir tree a wholesome food for cattle and sheep	293
§ III. Of the larch tree, it's value and uses	295
The value of it's wood remarked by Vitruvius	296
It's extreme durability remarked by Dr. Pallas	298
—by Mr. Harte and Admiral Greig	299
—by M. la president de la tour D'Aigues	302
—by a gentleman from Switzerland	303
—by Mr. Ritchie, British consul at Venice	304
—by Mr. Evelyn	305
—by a modern gentleman on the Alps	309
<i>N. B.</i> Larch trees at Dunkeld, measurements of	310
Even <i>young</i> larch wood very durable, several instances of	313
Larch wood neither shrinks, nor warps, nor is eaten by worms	321
—nearly incombustible	323
—The shittim wood of scripture	325
The larch tree is of very quick growth	325
Measurement of Mr. Newnham's trees	326
It grows on almost any soil	329
A plantation of larches will yield some return in 6 or 8 years	330
Uses to which young larch wood may be applied	
Hay rakes	331
Shafts for hoes, handles for brooms, scythes, &c.	332
Chairs, hop poles, hurdles, gates	333
Neat and durable railing, hen coops, &c	334
Fences for fields	334
Windows, joists, flooring, ship-building	335
Barrel staves	336
Hoops	337
Uses of larch brush-wood	338
For filling drains	339
Fuel	339
Venice turpentine yielded by the larch tree	342
Manne de Briançon	344

	<i>Page.</i>
IV. Directions for rearing plantations of larch trees for	
<i>profit</i> —————	345
The larch should be planted entirely by itself	345
Difference between natural grown woods and plantations	347
The red of wood, what — — —	347
Knots in wood, how produced — — —	348
Natural wood, and planted wood, the difference between them explained — — —	349
Plantations should be made very thick —	355
The trees should be planted out while very young	356
————— should be planted in squares —	357
The first thinning, how to be made — — —	358
Second thinning — — —	359
Third thinning — — —	359
Fourth thinning — — —	360
Benefits to be derived from these thinnings —	360
Farther thinnings, how to be conducted —	361
Hints respecting the profits to be derived from these plantations — — —	364
Sufficient fences necessary to protect plantations	368
Large inclosures recommended — — —	369
Stone walls — — —	369
Ditch and bank fence — — —	370
Furze, its uses in fencing — — —	370
The larix, it's uses in fencing — — —	372
The bramble, it's uses in fencing — — —	373
The sweet briar, or elegantine, do. — — —	380
Conclusion — — —	381

ESSAY THIRD.

HINTS ON THE ECONOMICAL CONSUMPTION OF THE PRO-	
DUCE OF A FARM	383
Introductory remarks — — —	385
Much dung is wasted under the common practice of pas-	
turage — — — —	388

CONTENTS.

lv

	<i>Page.</i>
The extra grafs produced by folding, from one acre of rich grafs should keep 3 sheep — — —	390
No fuch flufh of grafs is perceived, where folding is not practifed — — —	392
Nor any fenfible melioration of the ground perceived	394
Grafs land is not improved by being paftured upon	395
Folding, an economical practice — —	398
Mode of conducting that procefs — —	401
Comparative view of the advance in productiveness be- tween folding on grafs land, and fimply pafturing it	
1 ^{ft} , on an unproductive pafture —	403
2 ^d , on rich pafture land — —	407
Hard or light flocking of pafture ground confidered	410
Cutting grafs land, and confuming the produce in the houfe, beneficial, when confidered — —	413
1 ^{ft} , as to the confumption of the plants —	414
2 ^d , the health and comfort of the animal itfelf —	416
3 ^d , the quantity of manure obtained —	418
4 th , the quantity of herbage produced —	418
Confirmed by experience.	
1 ^{ft} , as to red clover — —	420
2 ^d , other kinds of grafs ground —	421
3 ^d , practice in this refpect in Germany —	424
Experiment propofed — — —	427
Rich grafs lands, if constantly cut, are not deteriorated	431
The quality of the grafs improves while kept under the fcythe — — —	433
Hard flocking improves paftures, and why —	434
Sweetnefs of paftures, what conftitutes this, explained	437
The fame weight of food, if palatable, will go much far- ther in fattening animals, than if it were unpalatable	438
The quantity of animal fubftance may be thus greatly augmented — — —	441
Horfes can be fed upon a much fmaller quantity of food than cattle — — —	444
Condiments, their importance in domeftic economy —	447
Utility of inducing beafts to eat as much food as poffible in a given time — — —	447
Observed in regard to feeding of calves —	448

	<i>Page.</i>
Pure water, it's use as a condiment — — —	459
Cramming of poultry — — —	450
Method of fattening geese in Languedoc — — —	480
————— ducks in ditto — — —	483
Receipt for feeding poultry, <i>note</i> — — —	455
* Common salt, value of in feeding beasts — — —	455
It is not in itself nutritious, but merely acts as a condiment	556
If permitted to be freely used, it would augment the	
food of cattle to an astonishing degree — — —	457
The duty on salt extremely pernicious — — —	458
Hay, the best mode of obtaining it of a fine quality — — —	460
Importance of having hay of a very fine quality — — —	460
How it may be cut, and immediately put up in the stack,	
while very tender and succulent — — —	464
A permanent roof for a hay stack, it's utility — — —	466
Mode of making hay under such a roof — — —	467
Economical mode of saving corn, if inned while fresh	
cut down — — — — —	471
On the right construction of farm buildings — — —	478
An economical arrangement for feeding cattle described	478
Noxious plants may be converted into nourishing food — — —	482
Exemplified in the yew tree, which is employed as a	
wholesome food for beasts in the province of Hesse — — —	482
Sheep may be stall fed as well as cattle — — —	486
Objections founded on the coting of sheep answered — — —	488
On the consumption of turnips by sheep — — —	491
Waste incurred in hurdling off turnips by sheep — — —	492
Turnips may be often more profitably applied in the rear-	
ing of sheep, than the fattening them — — —	493
Swedish turnip, or <i>Ruta бага</i> , it's peculiar excellencies — — —	497
Turnips may be employed for rearing young horses — — —	499
Conclusion — — — — —	499

POSTSCRIPT.

CURSORY REMARKS ON THE CORN LAWS OF GREAT BRI-	
TAIN — — — — —	501

ERRATA.

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ESSAY FIRST

ON THE

OBSTACLES TO AGRICULTURE,

AND THE

MEANS OF REMOVING THEM.

Il faut gagner les cœurs, et faire trouver aux hommes leur avantage dans les choses, ou l'on veut se servir de leur industrie.

FENELON.

ESSAYS, &c.

ON THE OBSTACLES TO THE ADVANCEMENT
OF AGRICULTURE IN ENGLAND, AND THE
MEANS OF REMOVING THEM.

INTRODUCTION.

THE discouraging *Report* of the Lords of the Privy Council, which was published a few years ago, concerning the deficient state of the agricultural produce of this kingdom, was so little calculated to flatter the national pride of the people, as to give a very general disgust at the time; and many persons felt, in their own minds, a strong propensity to refute these *ill grounded* assertions, as they thought they could easily prove them to be. This made them examine the subject with an attention it had never before obtained. The consequence has been, like what happened in many cases with the champions of the Roman Catholic religion against the Reformers, that those who engaged in the contest were finally made converts to that very doc-



trine which they intended to refute. Among other benefits that have accrued from these discussions, we may, perhaps, rank the institution of the Board of Agriculture as one, which, if its enquiries shall be prosecuted for a sufficient length of time, with due caution and energy, will be productive of national benefits, greater than perhaps have been derived from any other political institution in modern times. For, although the money which has been expended on this department, when compared with that bestowed on any other national establishment, may be considered as nothing, yet, in consequence of its exertions, continued for the course of little more than one year, a body of authentic facts, respecting the agricultural and internal economy of this country, have already been laid before the public, greater than was ever obtained in any other nation since the beginning of time; on which facts the political enquirer can ground his reasonings, on many of the most important topics that can ever engage his attention, with a degree of certainty he could *never* have otherwise obtained. In consequence of this, many ideal phantoms of proposed national aggrandisement will be banished, and, in their stead, plans of substantial improvement will possibly be

brought forward, which could not otherwise have been adopted; because the obstructions, which repress alike the suggestions of genius, and the hand of industry, would have remained unknown, as they hitherto have been in every European nation, and, of course, entirely unattended to by those classes of men who alone have power to remove them.

I could not produce a more striking illustration of the truth of these assertions, than the Essay which I am now about to submit to public consideration; for it will consist of little more than a compressed view of facts that have been brought to light by the agricultural surveys of the several counties already printed, some of which facts were unknown, or never adverted to, by every person who shall read this: for I presume no one person in any situation in Britain, could have otherwise had an opportunity of observing the whole; and innumerable persons no doubt exist, who are deeply interested in the discussion, who never before had adverted to one of them; and who, of course, could never be aware of the very important consequences that flow from them.

By a careful attention to these surveys, the principal obstructions to agriculture, (not to dwell on

those that depend upon natural causes, or that may be overcome by individual exertions, but those which owe their origin to political institutions, or which can only be removed by the conjunct exertions of numerous bodies of men,) may, as far as occurs to me at present, be resolved into one or other of the following heads, which will fall to be severally discussed.

<i>Commonable fields.</i>	<i>Lands in mortmain and entails.</i>
<i>Commons.</i>	
<i>Minute divisions of property.</i>	<i>Indefinite claims upon land, particularly tithes, and poors rates.</i>
<i>Intermixture of property.</i>	
<i>Mills.</i>	<i>Difficulty of communication between places.</i>
<i>Inadequate size of farms.</i>	
<i>Injudicious restrictions, and want of leases.</i>	<i>Want of proper markets in particular districts.</i>
<i>Want of adequate capital among farmers.</i>	<i>Injudicious fiscal regulations.</i>
<i>Inclosures injudiciously made.</i>	<i>Want of ready means for conveying agricultural knowledge.</i>

On each of these heads, I shall make some remarks.

§ I.

Commonable lands considered as an Obstruction to Agriculture.

THOUGH the very phrase *commonable lands* is not known in Scotland ; either because the practice which gave rise to the name was not there perhaps ever in any case strictly adopted, or, if it was of old adopted, it had been distinguished by another name ; yet this practice so universally prevails, either in a greater or smaller degree, throughout every county in England, that it comes forward in each of these surveys in a very conspicuous manner. From the supposed notoriety of the practice, as I suppose, I do not find that one person, among all those surveyors, has so much as attempted to give a definition of the phrase. It is not difficult, however, from the notices concerning it that are scattered through these reports, to form, as I hope, a tolerably just idea of the meaning of the phrase.

Commonable lands I understand to mean lands generally arable, at least in part, which belong in property to individuals who are known, and

the limits of whose property are ascertained; but which, in regard to their culture and mode of cropping, are subject to certain regulations, which custom, for time immemorial, has established, so as gradually to have acquired the force of law,—to which rules every individual occupying such property must adhere, until these old customs shall be abrogated, either by the *unanimous* consent of all the individuals having a right to these commonable fields, or by an express statute, obtained with their consent, for the purpose of annulling them.

From a bare statement of the case, it is easy to perceive that regulations, which were adopted at a very distant period, when agriculture might be said to be but in its earliest infancy in this island, and which were calculated to accord with a state of society very dissimilar to that which now prevails, must be extremely defective; and in particular, that they will prove an unsurmountable barrier to every kind of improvement, wherever they are suffered to exist. But it has been calmly tolerated, in every county in England, to an enormous extent even till the present time, without one national effort to remove it. In some counties, it appears that not much less than one half of the whole arable lands are in this state;

although it is evident, by the concurring testimony of the whole reporters, that, taking all these lands at an average, they do not afford *half* the produce the same lands would do, if they were put under the ordinary management that appropriated farms are subjected to in their respective districts; and not perhaps one tenth part of what they might easily be made to afford, within a very short period of time, should all other obstructions to improvement be removed.

It would be tiresome to enumerate the whole facts that occur in the different agricultural surveys, tending to point out the pernicious tendency of this mode of tenure; but a few of them may be mentioned. In one place it is stated, that a few inclosures had been made, seemingly with the concurrence of the whole parties concerned; but when the hedges had advanced nearly to become a fence, one of the commonable tenants went deliberately and pulled them up by the roots, and eradicated them entirely. In another case, [Bucks, p. 29.] the parishioners having come to an agreement to sow clover, after that practice had been universally acquiesced in for the space of 18 years, one of the farmers, occupying 16 acres of land, bought a large flock of lean sheep in the month of May, and turned them

on the clover crops, which were nearly in bloom; and no one could hinder him. In another case, [*ibid.* p. 30.] where custom had established the practice of having one corn crop, and one fallow alternately, the occupiers of the district came to an agreement to have *two* crops and a fallow, alternately; but before the expiration of ten years, one of the farmers broke through the agreement, and turned his cattle upon the crops of beans, oats, and barley; in which plan he was followed by the rest of his neighbours; and the crops were, in consequence, totally destroyed on that part of the field, which, agreeable to the antient custom, should have been that year in fallow.

These few notices, while they tend to illustrate the nature of the particular kind of tenure here complained of, at the same time clearly demonstrate its pernicious tendency to the public; so that it would be time mispent to adduce a greater number of proofs of a self evident proposition. No one who has considered the subject for a moment, but will readily admit, that it were much for the interest of Britain that no such practice existed in it; and that, of course, no time should be lost in endeavouring to eradicate it: for were this effectually done, it must

appear evident, from the facts stated, that the total produce of the kingdom would be greatly augmented.

Yet it by no means follows, that it would be prudent in the owners of such property, were it even at their absolute disposal, in every case instantly to abolish intercommonage. No practice can ever be universally established, by a long concurrence in opinion of a numerous body of men, which is not grounded on reason, and is calculated for their mutual convenience, under the circumstances in which they were placed at the time when such practice was established. And although it may happen, that, by a gradual alteration in the state of society, those practices which were once salutary, may become no longer necessary, but pernicious ; yet it will be in general found, that when this last comes to be incontestibly the case, the same common sense which at first concurred in establishing the practice, will, in like manner, at length concur in abolishing it.

From this train of reasoning, there is always room to suspect, that whenever a particular custom is loudly complained of by those who only casually consider of it, while it is acquiesced in without much seeming uneasiness by those who

are more immediately subjected to its operation, there must probably be some unobserved circumstances, which perpetually come in the way as great inconveniences, whenever an attempt is made to remove the *apparent* evil. And if such inconveniences are found to arise, it will be in vain to make laws to abolish it ; for, in these circumstances, the practice will still prevail in spite of the law, however peremptory it may be, and however beneficial in its tendency it may appear to hasty observers.

Can any thing, for example, be apparently more beneficial, or at first sight more easy, than to enforce an uniformity of weights and measures throughout a whole kingdom ? The proposition appears to be so self-evident, that the legislators of England, of Scotland, of France, and of many other kingdoms have separately judged, at many different times, that this might be done with evident advantage to all their subjects ; and laws have been repeatedly made in all those nations, as simple in their tenor as could well be expected, and as peremptory in their exactments as can be conceived ; yet in no one of these countries has it been ever found possible to enforce these laws. The fact is, that there are inconveniences to which such a change would give

rise, and which would be so universally felt by individuals, though they have been totally overlooked by legislators, that, it requires not the gift of prophecy to say, they will for ever stand in the way of such an improvement, until those circumstances shall be first adverted to and obviated.

Similar in kind, there is reason to suspect, must the inconveniences be that are in many cases felt, when an attempt has been made to eradicate the practice of commonable fields: for although it be true, that the difficulty of bringing a numerous body of proprietors to be unanimous in any one measure is very great, and that the expence of obtaining an act of parliament is such as to deter many persons from resorting to that measure, who would otherwise have been glad to avail themselves of that means, for silencing unreasonable opponents to their plans; yet there must be many cases, where a single proprietor is lord of the whole extent of commonable fields in one district, who in that case would have nothing else to do, but to allow his leases to expire; and then he has it in his power to turn out every tenant, who is not willing to accept a lease under such terms as he shall please to grant it. And where the whole of the commonable pro-

perty belongs only to two or three proprietors, the same thing could be effected with little more difficulty than in the former case, were it so obviously beneficial to all parties as at first sight it appears to be : but since we find that such measures are not generally adopted in these cases, I see still reason to suspect, that there must be some circumstances of general conveniency that stand in the way ; and it becomes of consequence to enquire what these circumstances are, in order to see whether these can be first removed, before any general law be recommended for abolishing this kind of tenure.

A person who is well acquainted with the practice of agriculture, can easily form an idea of many arrangements, under which a mutual intercommonage, at certain times of the year especially, and under particular modifications, might be not only a convenience, but even a *necessary accomodation*, without which, the tenant could not farm his lands. In all situations, for example, where the quantity of arable land occupied by one tenant is so small as that it cannot afford to maintain a sufficient strength of men or beasts to labour, and carry on the necessary operations upon it, that tenant must join with some other neighbour, in similar circumstances,

for mutual aid and assistance. Wherever the produce of the fields are so scanty, as to require a very wide range for the beasts which pick up that produce, unless the occupier of the land be able to stock such an extent of land, as to afford to keep a person, by himself, to tend his own flocks, an intercommongae between the smaller tenants, if such there shall be on that ground, becomes absolutely necessary. Wherever the number of cows that can be kept by one tenant are too few to eat down the produce of any field; to avoid the necessity of frittering it to pieces, by rearing innumerable fences for very small inclosures, it will be for the mutual convenience of all parties, to have the meadow laid open to the whole of these small tenants, as soon as the hay can be carried off from it. I might go on to quote other particulars, in which this kind of partial intercommonage might be convenient; but those above stated, are sufficient to account for the origin of commonable lands, and to show that the practice was not only necessary, at the time when it was first established; but that, under the same circumstances, it is equally necessary now, and must continue to be so till the end of time, if the state of occupation on these lands shall continue to be the same.

The fact is, a similar practice, under whatever name it may be known, must have prevailed, and must still prevail, in every country where land is parcelled out among tenants in allotments too small for the state it is in at the time to admit of, under a strict appropriation. In Scotland, it was, and is known, with this difference between the practice there and in England,—that whereas in Scotland every man's possession is, by the law of the land, declared to be his own exclusively for the time he holds it ; and that of course he can punish any person who shall trespass upon it without his permission ; a reliance being placed upon the common sense of men, and their mutual interest, as sufficient to insure good neighbourhood, and a voluntary interchange of mutual right ; in England it has been judged to be more for the mutual benefit of the parties, to insure themselves against any infraction of good neighbourhood, by establishing general regulations for that purpose ; which were to compel the refractory to yield the unlimited exercise of his own will to the general sense of the community.

It thus appears, that if *common-field* husbandry be an obstruction to agriculture, which no considerate person will deny, this would not be annihilated merely by obtaining a law for its aboli-

tion. This evil, in fact, resolves into another, viz. the inadequate size of farms, which will come to be treated under the fourth head above enumerated ; and, till care be taken to obviate this difficulty, there will be so many interests deeply affected by any proposed change in the state of *commonable lands*, that innumerable obstructions will occur, in attempting hastily to abolish the practice by law, without taking judicious precautions to guard against the difficulties that may be expected to arise.

And it deserves to be particularly adverted to on this occasion, that however detrimental to the public at large, the practice of occupying commonable lands may be ; or however much the income of the owners of such lands must thereby be diminished ; it is a matter of comparatively small importance to the tenants, or occupiers of such lands : for to the tenant, especially if a tenant at will, or one having a lease renewable by fine upon lives, (under which two kinds of tenure the greatest part of commonable lands are occupied,) it is a matter of very little consequence, whether the land he occupies yields on an average, ten quarters *per* acre, or ten bushels only : for, under these circumstances, the rent that another person would be willing to give for



the premises, will always be exactly in proportion to the *free* produce he thinks he can dispose of from the lands. If the lands were rich, therefore, the occupier of the land must lay his account with paying a proportionably higher rent, or quit ; so that his actual profits may be equally great upon these lands in their present state, as if they were capable of yielding ten times their present produce. What inducement has such a man to make exertions in industry ? It is rather his interest to let things continue as they are : for this will effectually prevent spirited men, who have stock for carrying forward agricultural improvements, from ever thinking of interfering with him in a competition for his miserable farm. In this way, a proprietor who shall think of making an alteration on tenures of this sort, must frequently find that he meets with a body of *vis inertiae* to remove, which it is impossible for him to overcome. It is, as if a fisherman in his boat were to attempt to move the Craken of Pontipidon. He finds it exceeds his force, and he must finally give over the attempt as hopeless.

But though a law, which should set aside all the practice of commonable fields, could such a law be actually obtained, would not, of itself, remove the evils complained of ; yet, as there may

occur many cases, in which the proprietors, were they at liberty to act with freedom, would perceive it was their interest to adopt such measures as should admit of having these, now commonable lands, cultivated in a proper manner, it would surely be a very desirable thing, if some easy mode could be devised for giving them that freedom, when they found they could avail themselves of it with propriety ; while it should, at the same time, allow others to retain the undisturbed enjoyment of their present commonage, until a fit occasion should present itself for altering it.

In all cases of this sort, it is necessary to proceed with caution ; and whenever recourse can be had to experience, in similar cases, that ought to be consulted in preference to any preconceived idea, however beautiful, that never has been carried into practice : for unforeseen difficulties in every new case occur, which are often accompanied with very serious consequences. In the present case we find, that the same evil which subsisted in Scotland, nearly, as I suppose, to an equal proportional extent as it now does in England, has been gradually done away, without violence or difficulty of any sort ; merely by *permitting* every one who found it his interest to abandon the practice of intercommonage, to do so,

without positively *requiring* that this, in any case, should be done, till some one of the parties wished for it. It is true, that in this way, it would be in the power of one man, at times, to incommode his neighbours; but it is also true, that he cannot do this without being disquieted himself, unless his situation be such as that it is much for the benefit of the community at large, that he should exercise this privilege; and it has been found, that in practice this privilege has scarcely ever been claimed, but in these circumstances.

Now, could an act be obtained, which should put the whole tenants of the commonable lands in England precisely in the same condition with lands occupied by the same class of persons in Scotland, it does not appear that any other consequences should be experienced in the one case, than those that have been felt in the other. This appears to be a very easy matter: for were it simply enacted, that “the practice of no person occupying lands in England, should be influenced by the will of any person whatever; unless it were in respect to those things alone which a tenant specifically agreed to perform in his lease, any law, privilege, or custom to the contrary, notwithstanding;” the thing would be at once done. In that case, the *occu-*

piers of commonable lands would be at perfect freedom to continue to intercommon, as at present, if so they should incline ; but whenever any one among them found his situation such as no longer rendered his practice beneficial to him, he could withdraw himself from the association, without having any power to dissolve the connection of the rest of the community with each other, as long as they inclined it should continue in force.

We have, in Scotland, the experience of precisely such a law, in a case nearly similar to that here treated. During the course of many ages, a vast diversity of practices had been there established by custom, in regard to certain services that were wont to be performed by tenants to their lords, which were accepted in part of rent. These practices, like those of commonable lands in England, varied in every district, and parish, and barony ; so that, perhaps, no two of them were alike in all respects : but every court of barony took cognisance of the old usages established in that barony, and all the tenants in it were bound to pay these services *according to use and wont*. With the change of manners which gradually prevailed in every part of this island, a change of ideas took place ; and, like the commonable rights

in England, these services, established by *use and wont*, were generally accounted a grievance that ought to be removed. Accordingly, in the act which took away all heritable jurisdictions in Scotland, which was passed in the year 1746; a clause was introduced, declaring that all *indefinite* stipulations in a lease were entirely null and void; ever since which time, those vague terms of *use and wont* have been considered as nothing in every court of law; though services in kind, when particularly specified, are still as much accounted a part of the rent as any sums in money, or other prestations. The law proposed, therefore, would not be without a precedent, which in its execution has been found to be easy, as in its operation salutary.

With regard to the intermixture of lands which in many cases, take place in these commonable fields, to the very great detriment of agriculture; the same thing took place in Scotland, under the name of *run-rig*; a practice which took its rise in those times of anarchy, when individuals were often marked out for destruction by other individuals: for, by their mixing the property of one with another, every attack upon one became an attack upon the whole, which all, of course, were bound to defend. This in-

termixture of land respected either the possession by the tenants only, which was sometimes intermixed, while that of the different proprietors were separated; or it respected the property of the proprietors also, which were sometimes blended together in small detached parcels. Both these evils have now been remedied so effectually, that scarcely any vestiges of them are found to exist. They have been got rid of in this manner. Where the intermixture of ground was only among the tenants belonging to the same lord, he usually allowed all the leases to expire before a renewal of any one was granted; and when the lands were thus out of lease, he divided the whole into farms, usually the same number as before, and then re-let them as separate farms. Where the intermixture was of separate properties, very often those proprietors agreed to authorise certain persons, named by themselves, to make a fair and equitable division of the properties; assigning to each the part appropriated for him, in the situation that best suited him, or what was most contiguous, if he had other adjoining property. But if one or more of the parties stood out, and would not come to an amicable compromise; then it was competent for any one of the parties, who chose

it, to bring an action before the sheriff of the county for a division, who, after nominating persons skilled in matters of this sort, to divide and apportion the ground in dispute, and to give in a report ; and having heard parties, and visited the ground in question himself, and seen the boundaries fixed before numerous witnesses, the sheriff proceeded to give an award, which was final, unless, upon appeal to a higher tribunal, (which was competent,) his sentence should be altered. In divisions of this sort, I do not recollect ever to have heard of an appeal from the decision of the sheriff. It is, at the same time so little expensive to the parties, and so well calculated for the distribution of material justice, in cases of this sort, that it is not perhaps possible to propose a better model for imitation.

Were these, or similar regulations, adopted in England, there seems reason to be satisfied, that all the evils originating from the practice of *common field husbandry*, so much, and with such reason, complained of at present, would be effectually and imperceptibly removed ; without any convulsion or violent struggle. If all the other obstructions to agriculture shall admit of as easy a remedy as this one, we may hope to see the improvement of the country put upon a very desirable footing, even in our own day.

§ II.

Of Commons, as an Obstruction to Agriculture.

IF *commonable lands* be complained of as a grievance, *commons* must justly be accounted an evil of still greater magnitude : and this also is experienced to an astonishing extent in every county in England. Among the distinguishing characteristics of man, the most peculiar is the faculty of observation, that has been conferred upon him by the beneficent Creator of the universe. By means of this faculty, he is enabled to compare together facts that fall under his observation, to reason upon these, and to draw conclusions from them thatt end to accommodate himself. It is by this means he has been able to discover, that a soil which in its natural state, is perhaps incapable of producing almost any of those things that are necessary for his subsistence, may be so managed as to be made to yield abundance of the most delicate products of the earth : nor is it possible to set any limits to the encreased fertility that a continued industry, under the guidance of reason, may confer upon even the most

infertile soil. It was by means of such exertions, that Palestine of old, from being one of the most infertile regions on the globe, had become, in the strong language of the scriptures, a land flowing with milk and honey; and was capable of then supporting within itself, a population at least an hundred times greater than it can do in its present state, after it has been suffered to revert to its original condition merely by withdrawing the industrious exertions of man. There are many instances, in our own country, where a field has been, in the course of a few years, made to yield a thousand times its original produce. But in a country where commonage universally prevailed, this favoured gift of reasoning, would, in this instance, have been conferred on man in vain. He can then only trample under foot a forlorn waste, which, though it possesses the capability of being made to afford him innumerable comforts, he is effectually barred from indulging the cheering hope of being ever permitted to enjoy. He is indeed debarred from ever being able to ameliorate the soil, and thus to augment its product to the state; but he is not prevented so effectually from deteriorating it. While in the state of a common, the surface of the ground may be broken by him in such a

way, as not to recover for ages a sward equal to that which was originally upon it. It may be cast up and sunk into pits: it may be converted into wet and rotten marshes, by casual obstructions being thrown in the way of the water, which no one finds it his interest to remove: it may, in short, while a common, be abused in a thousand ways, by reason of the obstinacy, indolence, or caprice of individuals; but it never can be benefited by the industry of man: and not only *may* this be done, but these things actually *are* done, in innumerable instances, in this land of freedom; so that to a person who contemplates the loss that the nation must sustain by these deplorable abuses, nothing can afford a more melancholy train of reflections, than that which the frequent recurrence of those disgusting commons suggest to his mind, as he travels over that, otherwise delightful, country of England.

When he stops to enquire more minutely into the effects of this kind of property, upon the morals and domestic economy of the individuals who claim a right to these commons; he only finds additional causes for regret. He frequently discovers, that the quiet and industrious cultivator, having a right upon a common, is obliged to abandon that right, because of the harass-

ments to which he is subjected from turbulent and assuming neighbours ; who have obtained a small footing there, with a predetermined resolution, perhaps, to encroach much farther than their rights would authorize ; because they know that, towards the restraining of these excesses, no obvious and easy means occur. Thus does the peaceable man often find it better to relinquish his right almost entirely, than be subjected to the perpetual contention that would occur in defending it. Such an enquirer frequently finds, that in consequence of this the small flocks of the poor cottager, who cannot afford to look after them continually himself, are so tormented, by being chased from place to place by those marauders, that, instead of a relief to the poor cottager, these flocks prove only a torment to him : his family becomes in consequence of this, a burthen on the parish, which is obliged to support them : he finds, that among those who are bred up in these situations, there are many young men who delight more in active plunder than in sober industry ; and who, tempted by the high prices that luxurious inhabitants of towns offer for game, become poachers, and form such powerful confederations of determined profligates for their mutual protection,

that no one less determined that themselves will dare to interfere with them ; which enables them to carry on their depredations with impunity. He observes, that the money these young men thus acquire, is usually squandered in drinking and riotous excesses : the young women are contaminated by their conversation, corrupted by their excesses, and debauched ; the least evil attending which courses, is a great number of illegitimate children, and an extravagant poor rate. But who can estimate the detriment that a nation sustains, when the morals of the country inhabitants of it become corrupted ? It is like tainting the springs of water with poison, which, instead of promoting health and vigour, as they naturally ought to have done, produce one universal mass of infectious disease.

It is common to read in the history of Britain, that the *rot* became, at times, so prevalent in England, as to carry off many millions of sheep at once ; and these diseases were regarded, like the pestilence among the human species, as a terrible visitation of heaven for the sins of a guilty land. There is great reason to believe, that these frequent mortalities among the flocks were entirely occasioned by the numerous contumens, which were in those times much more extensive than at

present: for it is still known, that in neglected spots, where water is allowed to stagnate and generate marshes, as is often the case with commons, when the season proves wet, the sheep pastured upon them are, to this day, so much subjected to the rot, as to induce many persons rather to give up their right, than to allow their flocks to enter upon these unhealthy pastures. Considered under every possible point of view then, it appears to be undeniable, that the prevalence of *commons* is a great national grievance, which ought, if possible, to be removed; and that the Board of Agriculture cannot be more beneficially employed, than by granting all the aid that their wisdom can devise, for removing those bars that at present tend to prevent the equitable division of this kind of property.

As to the *extent* of these commons in Britain, facts are still wanting to ascertain it with precision: nor is exact precision in that case absolutely necessary. From every one of the agricultural surveys yet made, it is evident, that in every county in England and Wales, there are extensive tracts of land of this description, (for *commons* and *wastes* may be considered as nearly synonymous terms, although it be a truth, that many of these commons consist of land naturally as good as any in the kingdom). The President

of the Board of Agriculture has given a slight view of the estimated extent, and probable improvement of which these lands would be susceptible, if divided. Of the extent of these lands, were it necessary, a tolerably accurate knowledge might be attained; but as to the amount of improvement, it is impossible for any person to form at present an idea of it, should the prosperity of this country *be permitted* to go forward, for a considerable track of time, in that accelerating *ratio* into which it would naturally fall, if the general tranquillity of the nation shall be preserved; and the other obstructions to be mentioned in this essay, which have hitherto repressed exertions in agriculture, be removed. It is enough here to say, that it would be an object of immense magnitude. I have already had occasion to observe, that in some favourable situations, it is well known that land, in the course of a very few years, has been made a thousand times, at least, more productive than in its original state. Many commons are at present lying waste, in situations equally favourable, as these: and many other situations may become equally favourable, by an extension of those modes of facilitating intercourse, which are now in contemplation; and are only prevented from

being carried into effect by barriers that judicious laws may easily remove.

The origin of commons may be traced to the same source with that of commonable fields; viz. an inadequate size of individual possessions: and so long as this mode of parcelling out lands shall continue, those having a right to commons, will have the same objections to a division of them, as the tenants of commonable lands must have; with this difference, however, that some individuals among those having a right of commonage, being much more conveniently situated for availing themselves of that right, than others equally entitled to it who live at a greater distance, it must of course be the interest of the first to oppose any division of the common, which can be supposed to have justice for its basis. To require then, as the law at present, if I am rightly informed, actually does, an *unanimous* consent of all the parties concerned, (were minors and fatuous persons out of the question,) before a division can take place, unless under a special act of parliament, obtained expressly for that purpose, is nearly the same thing, as saying that no division of a common can take place, without a special act of parliament for that purpose.

There are three circumstances that have hitherto tended greatly to retard the division of com-

mons in England These are, *First*, the great expence that must, in most cases, be incurred, before an act of parliament can be obtained for the division of a common. *Second*, the difficulties that occur in setting just bounds to the claims of the lord of the manor, and the tithe owner. And, *Third*, the expence that necessarily must follow such division, in consequence of the general practice that has hitherto prevailed, of obliging every one of the owners of such divided property immediately to inclose their respective shares, even where the circumstances are such, as that a prudent economy would not permit the effecting of such inclosures, but much the reverse. Were these three obstructions to be moderated, or totally removed, much good would result from it: nor does it seem to be impossible to do this.

In regard to the *first* circumstance, the expence of obtaining an act of parliament for *dividing*, which I would wish to substitute for *inclosing* of commons; this, I am assured, in all cases, amounts to such a sum, as to exceed the whole present value of many small commons, were they fairly sold by open auction. Of course, if no mode shall be devised for removing this bar to their division, all such small commons, which, though they may be of little value *individually*, would

be of great national concern *collectively* considered, are doomed to remain in the state of *wastes* till the end of time. In intricate cases, or where some of the parties concerned are wealthy and obstinate, I am assured that the actual expence incurred before an act has been obtained, for authorising the division of a common, has amounted to the enormous sum of several thousand pounds. With the dread of even the chance of any thing like such a charge being incurred, it is easy to see, that many owners of such commons must feel a great reluctance at taking any steps that might eventually subject them to such an alarming expence, before they can be permitted to begin to improve their own property.

In regard to the *lord of the manor*, who has sometimes a very small claim in other respects upon the common lands, his single negative, in the present state of our laws, if I be rightly informed, proves an absolute bar to every attempt at a division of a common so that if this man should be capricious and obstinate, he may prevent such a salutary measure from being carried into effect; even though all the other parties concerned should be unanimous for it. I do not know how the case stands in this respect, in regard to incapacity or nonage; and in respect to *tithes*, I

know of no method that has yet been devised for satisfying this demand; but that alone of obtaining the consent of the tithe owner, to agree to accept of such a specific sum in money, or such a proportion of the land itself as shall content him *in lieu* of tithe: nor can even this be done, where the tithe is claimed by the clergy, so as not to be liable to future challenge, unless under the sanction of a special act of parliament: so that if these men shall prove greedy, capricious, and obstinate, a great deal of expence must be incurred before their claims can be settled; the dread of which must also operate, in many cases, to prevent a division of this kind of property.

How these different obstacles are to be removed, will require the mature deliberation of the honourable Board of Agriculture, and the legislature at large. But the object is of such consequence, as to demand their most serious attention. With a view to pave the way for such deliberations, I shall beg leave, with due deference, to submit to their consideration such hints as have occurred to me on this subject, after the most careful attention that I myself have been able to bestow upon it, aided by the suggestions of several men of sound understanding, who are well

acquainted with things of this nature, with whose opinions I have been favoured.

I have found it to be the general wish of every person with whom I have communicated on this subject, that one general act of parliament should, if possible, be obtained, under the authority of which all commons might be divided; without the necessity of applying for a separate act for the division of each individual common. Nor does the thing seem to be at all impracticable. Under the authority of just such an act as the gentlemen in England seem to wish for, I find that nearly all the commons in Scotland have been divided, within the space of about an hundred and thirty years past, with little expence or trouble to the parties; so that a common, in that country, unless it be precisely those that are excepted by this act, is scarcely now to be found. I cannot help remarking, in this place, as a circumstance greatly in favour of the measure proposed, that the same idea occurred to many individuals, who had in England separately considered the subject; none of whom knew that such an act as I am now about to quote, had ever had an existence; or were in the least acquainted with the manner in which it had operated. The act I allude to is so short, so simple,

and so comprehensive, that I shall hope to be excused for quoting it entire. This act was passed in the year 1665, and runs *verbatim* thus.

“ All commons, excepting those belonging to
“ the King in property, or royal burghs in bur-
“ gage, *may* be divided at the instance of *any*
“ individual having interest, by summons raised
“ against all persons concerned before the Lords
“ of Session, who are empowered to discuss the
“ relevancy, to determine upon the rights of the
“ parties concerned, to *divide* the same amongst
“ them, and to grant commission for perambulat-
“ ing, and taking all other necessary probation,
“ to be reported to the Lords, and the process to
“ be ultimately determined by them ; declaring,
“ that the interest of the heritors having right
“ in the common, shall be estimated according to
“ the *valuation* of their respective lands and pro-
“ perties ; [having right to that common,] and
“ that a portion be adjudged to each adjacent
“ heritor, in proportion to his property, with
“ power to the Lords to divide the mosses, if
“ any be in the common, among the parties hav-
“ ing interest ; or in case they cannot be divided,
“ that they remain in common, with free ish and
“ entry, whether divided or not.”

No eulogium can be too high for the comprehensive clearness of this short act; which is in no respect liable to ambiguity or misconstruction of any sort. The consequence has been, that in its application, it has been the most easy and satisfactory to all parties that can be conceived. It puts it in the power of *any* individual having interest, to *force* a division of a common, whenever he shall find it suits his own interest, by a very simple process, that can be raised at a trifling expence. It puts it in the power of every person concerned, to bring forward their just claims; and prescribes an undeviating rule by which they are to be adjusted. And, finally, it allows every person to use the property that shall be thus awarded to him, in that manner which shall seem best calculated to promote his own interest, without limitation, or restraint.

In regard to *inclosing*, the general law of the land is allowed to apply here as in every other case. The law in Scotland respecting inclosures, is, that if any one chooses to inclose his property, he can *compel* any adjoining proprietor, by means of a process raised before the sheriff of the county, to freight marches, where necessary, at the sight of the sheriff; who must perambulate the marches, and settle the line, if the parties do not agree

upon it themselves ; and to make each party bear one half the charge of a common march-fence. The sheriff, also, is to prescribe what this fence shall be, if the parties disagree ; which fence is to be upheld in all time coming, at their mutual charge. This is the practice by those who choose to carry the law to its utmost rigour. But the general practice is, (and what I humbly conceive *ought* to be the law) that if one of the parties wishes to make an inclosure for his own convenience, one side of which runs along the line of the march, while the adjoining proprietor has no intention of *there* making an inclosure at all ; in that case, the *first* erects the fence that runs along the march, entirely at his own expence, as well as the other fences round his field : nor does he claim any part of that expence from the adjoining proprietor, until that proprietor avails himself of it, by making it a part of the fence of an inclosure made on his side also ; at which time, and not before, he pays to his neighbour the half of the original expence of rearing that fence, and is at half the expence of upholding it ever afterwards. This is also the rule adhered to respecting partition walls, that mutually belong to adjoining buildings ; and seems to be consistent alike with the strictest

equity and good neighbourhood : and it would be doubtless attended with very good effects, were this rule adopted universally in England, with regard to all inclosures to be made, whether on commons, commonable fields, or otherwise.

Though the law above quoted was perfectly applicable to the state of common lands in Scotland, at the time it was made : yet, as there are some peculiarities respecting commons in England, that did not there prevail ; in an act to be obtained for the same purpose in England, provision ought to be made for these circumstances. The feignorial rights claimed by the lord of the manor over commons in England, never seems to have been exercised in Scotland ; and therefore they are not attended to in this act. A common, in Scotland, seems to have been considered merely as having been originally a tacit agreement only between the adjoining proprietors of land, to allow a certain proportion of their fields to be pastured and otherwise used, *in common*, for the mutual convenience of their respective adjoining tenants. It seems to be understood, that no one of these proprietors gave up the right to any part of his property, in consequence of throwing it common ; but merely admitted of inter-commonage for pasturage, or other purposes of

mutual accommodation to the tenant. It was therefore understood, that no person but the adjoining heritors, or their tenants, had any right whatever to the common; nor even that these proprietors had any claim upon these commons, except for so much of their lands only, as had a right of commonage upon them by immemorial practice. On these principles, the law has been constructed, by which each proprietor is entitled to resume the whole of the property, it was supposed he had only confounded with that of others for a time. In England, ideas of another kind, respecting the original property of commons, seem to have prevailed. The whole property of the common appears to have been conceived originally to belong to one person, who allotted to his own tenants, or the holders of his own lands around the common, or to others whom he chose to tolerate upon it, a right to have the same use of the surface-produce of the common, as a tenant usually enjoys of their lands; or other partial use of it only; without giving up his exclusive right to the soil itself, or to mines or minerals under the surface: that in selling off the adjacent property which had a right to the common, either in whole, or in part, he gave off with each parcel of land so alienated, the same right upon the com-

mon, that his tenants on that parcel of land formerly enjoyed, and no more ; and that, of course, he himself still retained his seignorial rights over the whole as before. In consequence of which, we find, that there are two separate interests to be averted to in the division of a common in England, that were not known in Scotland, which will, of course, require to be averted to in any general law that shall be made for dividing commons in England. These are, the lord of the manor, and those persons who, by mere occupancy, have acquired, by prescription, a kind of right that the law considers as valid ; though in no way connected with a separate possession of land, beyond the bounds of the common itself, and still in no wise affecting the seignorial rights of the lord of the manor over the whole.

There is yet another interest, that was not recognised as affecting common lands in Scotland, at the time the above act was made, which ought to be attended to in England ; viz. that of the person claiming a right to the tithe. In Scotland, every common was considered as an appendage to, and a constituent part of two or more farms that lay contiguous to the common ; and that, of course, the rent of these farms were higher or lower, in proportion to the benefit the tenant de-

rived from the common. And as the tithes in Scotland are all, by law, liable to be converted into a fixed sum, according to a certain *ratio* prescribed by that law, *in proportion to the rent*, it followed, that when the proportion of the common belonging to each farm, was ascertained and allocated in feveralty to that farm, it did not materially alter the case in regard to tithe; and was not to be separately adverted to. In England, where the tithe is usually drawn *in kind*, and where the tithe owner claims a right to draw tithe for even all the produce that has been created by the joint exertions of industry, and outlay of capital, it becomes necessary, if that tithe is to be abrogated, to make a provision for this interest also. Instead of the clause in the above act, which runs thus; “ declaring that the interest of the heritors having right to the common, shall be estimated according to the valuation of their respective lands and properties,” a clause to this purpose may be introduced; “ declaring, that the seignorial rights of the lord of the manor shall be preserved: the rights of the tithe-owner preserved, either by an adequate allocation in money, or a proportion of the soil; the quantum of either money or land to be appropriated *in lieu* of tithe, to be ascertained by a jury of re-

“spectable men in the vicinity : and the surface-
“right to be divided among all the other parties
“having an interest in it, according to the valua-
“tion, (or the rent, or the value they are put at
according to the estimation of a jury, as the one
or other mode shall seem most eligible, when the
bill is under discussion,) “of the respective lands
“and properties they hold, having a right to the
“common.” Something to this effect seems to
be all that is requisite to adapt the act, *mutatis
mutandis*, to England as well as Scotland. Should
it be thought more eligible by the parties, to
abolish the feignorial rights entirely, on the divi-
sion of the common, perhaps it might be well to
leave it in the option of the parties, at that time
either to purchase that right by a sum of
money, the quantum to be ascertained by a jury,
or to leave it entire, as should prove most agree-
able to the parties: but unless three fourths in
value of the proprietors, at least, exclusive of the
lord of the manor himself, shall concur in a de-
sire to purchase the manorial rights, it shall not
be competent to compel a sale of them.

Were a law to this effect obtained, *authorizing*,
though not *requiring*, the immediate division of
commons, with little expence to the parties con-
cerned, it is not to be doubted but, in a few years,

most of the commons in the kingdom would be divided, and gradually brought into such a state of cultivation, as would very soon make a great addition to the annual produce of the kingdom, without encroaching on the rights of any one.

§ III.

The minute Division of Property a cause of the Retardment of Agriculture.

IT requires but a very slight degree of consideration, to perceive, that wherever property is much divided, the bars to any measure of general utility that shall be proposed, such as roads, canals, irrigations, &c. must be multiplied to an astonishing degree.

The tenure called *gavel-kind*, which implies a division of all the landed property a man holds, in equal portions among his children; though it seems to be, at first sight, a very just and equitable institution, seeing it is an obvious truth, that all the children of any man have an equal right to his care and kindness, and consequently, to an equal share in his property: yet here, as in many other cases, this law of strict equity in speculation, appears to be, when rigidly applied in practice, highly injurious to society; and had not means been invented to counteract this law of *justice*, as some would call it, the property of this island, would have been divided into such parcels, long ere this time, as to have proved a

total bar to the cultivation of the soil in any way. For example, suppose a man to be possessed of one hundred acres of good land, worth one pound an acre *per annum*; which is one of the most favourable cases that can be supposed to admit of a small division of property: and let it also be granted, that three children, on an average, may be produced from each marriage. This hundred acres would, in the first generation, be divided into lots of thirty three acres each, omitting the fraction; in the second generation, the lots would be eleven acres; in the third, three acres and a fraction; in the fourth, one acre each in the fifth, 59, say 60 falls [poles]; in the sixth, 20 falls; in the seventh, 7 falls nearly; in the eighth, $3\frac{1}{3}$ falls, or 66 yards; in the ninth, 22 yards; in the tenth, 7 yards nearly; and in the eleventh, two and one third yards. Thus, in the course of eleven generations, each man's property would be barely sufficient to make a grave to hold himself.* In this case, it might truly be said, that *summa jus is summa injuria*. Supposing it were possible to make these divisions without disputes and heart-burnings: supposing charters, for defining these, could be obtained without expence, (neither of which we know could possibly take place, and either of which would be productive

of unfurmountable inconveniencies,) yet still this would be a small evil, compared to those that follow: no inclosures could be made, no ground could be plowed, no cattle could be grazed; nothing would remain, but for each man to lie down and die upon the small spot he claimed as his property.

Instead of that excess of *speculative* justice, the wisdom derived from *experience* has happily remedied all these evils, by departing from the idea of chimerical *rights*, that can in no case be ever exercised, and adopting another rule, which though it appears, at first sight, to be grounded on injustice, has been found to be dictated by wisdom. The law of *primogeniture*, (*a*) which prevents landed property from being frittered away into such small portions as would render it useless, while it enables the father, by burthening the eldest son with the payment of such sums out of it, for younger children, as he sees expedient, puts it in the power of every owner of land, to make as minute a division of his territorial property as he may think proper, without cutting it into pieces. The consequence is, that when these portions of land become too small to admit of being usefully divided, the whole of the property must be sold; and so this unwieldy

mas, by passing to another person who has funds abundant for the acquisition of it, throws into the hands of those whose substance was too mean to allow them to make a *proper* use of that kind of property, another kind of property, *cash*, which can be applied in a thousand ways, in the most minute proportions, towards exciting energy in exertions of industry. This is one of those few political institutions, which, on account of the unconstrained tendency of its operation to promote the public weal, somewhat resembles, in this respect, the beneficent operations of nature, though it seems to run directly counter to that ideal perfection which, to the disgrace of the *learned*, has assumed, among the philosophers of the present day, the place of common sense, by substituting ideal phantoms, instead of well authenticated facts, as a basis on which all reasoning concerning human affairs should ultimately depend.

§ IV.

Intermixture of Property an Obstruction to Agriculture.

WHATEVER tends to divide landed property into very small patches, necessarily tends to throw it, in time, into the most awkward state of intermixture; many instances of which occur in a variety of the surveys. Suppose, for example, a field, consisting of ten acres, or ten ridges, was divided among ten children; and that these portions were laid off in the most regular order; no one person having any part of his property disjoined from any part of what belongs properly to himself; but the youngest, we shall suppose, chooses to sell his share to the eldest. Here the eldest becomes possessed of two acres, or ridges, one at each side of the field, without having any part of the intervening property. If he should get still richer, and should purchase another share from some of his other brothers, he thus gets three bits of property, all of them detached from each other. So on, the evil may be encreased in *infinitum*. Something of this nature must be accounted the origin of those little patches,

called *flangs*, in Wales, so often to be met with, lying scattered in the midst of another man's property, to the total obstruction of all improvement, and the perpetual annoyance of the neighbourhood, wherever they take place.

It would, perhaps, be using too free with private property in this island, to say, that it should be ordained, that wherever a patch of ground belonging to one person, not exceeding acres, which is supposed to be the lowest size of a field capable of proper culture, was found lying in the midst of fields belonging to any other person; in that case, it should be competent, upon a proper application, for a court of justice to compel that person, either to sell that property to the owner of the surrounding land, at a price that should be deemed a fair one, by an unprejudiced jury; or to accept of land *in lieu* of it, that should, by a jury, be deemed of equal value, lying at one side, contiguous to some road, or other convenient boundary, that should not necessarily tend to interrupt the proper culture of the fields: yet, a man of an upright mind, who had the public good only in view, without regarding private prejudices, would hardly perceive any valid objection to such a law; especially if it should give the holder of such interjected pro-

perty an option to choose the one alternative, after he had seen the determination of the jury in regard to the other: that is to say, when a price had been assigned which he judged inadequate, he should be permitted, in its stead, to choose an allotment of land, or *vice versa*. But if, with all these limitations in favour of the holder of small property, the above measure shall not be deemed expedient, I must leave it to the wisdom of parliament, to devise one that shall be less exceptionable. For this evil so much prevails, especially in the distant and unimproved parts of England and Wales, as loudly to call out for a remedy, if the effectual improvement of the country be seriously intended.

§ V.

Mills considered as an Obstruction to Agriculture.

THE practice of irrigation, with a view to promote the fertility of the soil, and counteract the backwardness of the climate, is already pretty well understood in a few districts, where it is known to be the greatest and the cheapest improvement of land that has ever yet been discovered. And as the knowledge of it will quickly, it is hoped, be now communicated to all parts of the country, there can be no doubt but it would be soon *universally* adopted, to the unspeakable advantage of the nation, were it not from the opposition that owners of mills, in all cases, make to the diverting the water from its ordinary channel, for an indefinite distance above them, even where the property of the ground through which the water flows, is not their own; or where it returned into its former channel, before it reaches their mill: alledging, that they have a servitude for the use of the water; and, that whatever diminishes the quantity of that water, if it is at

any time scanty, is a manifest abatement of the value of their property, which they consider as not to be allowable : not adverting that the same argument, to perhaps a much greater amount, might be adduced by the others. And as, at the time that water-mills first came into use, they were judged to be a very great national improvement ; those who erected such were encouraged in these laudable attempts, by many privileges and immunities conferred upon them : and in all cases, where disputes arose respecting mills, the most favourable construction possible was put upon every circumstance that affected the owners of them. In consequence of this, a body of decisions, favourable to the claims of mill-owners, might be found so formidable, as to deter any man from thinking of engaging in a law-suit with them. These circumstances have given to the holders of water-mills, a preponderance in the scale of property that they ought not to enjoy. And the time has long since been arrived, when these indefinite privileges ought to have been restricted and defined by law ; which becomes every day more and more necessary, now that canals for internal communication, and for irrigation, are called for universally ; and, in many cases, are entirely interrupted by the ob-

structions that this circumstance throws in the way. Nothing can show more strongly, than the present case does, the necessity that there is for reserving a power in parliament to remove obstructions that the laws themselves, from a change in the circumstances of the country, may have thrown in the way of improvements; or the futility of the reasoning of those who contend, that *justice* requires, that in every case, where old established custom, which is, in other words, the common law, has authorised or encouraged a certain practice, it is incompetent for the legislature to interfere ever afterwards, in restraining, new modelling, or, in any way curtailing these practices. If legislators act to the best of their knowledge, by giving their silent acquiescence to certain practices, which seemed to be good, and calculated to promote the public weal, at that time, they perform all that can be required of them; but if facts shall be afterwards discovered, which show, that these well-intended laws come, in time, greatly to retard, instead of promoting the general prosperity, would it not be absurd to say, that those evils must not be removed, which a change of circumstances has brought to light? At the time water-mills were first introduced and en-

couraged by the legislature, the use of water, for the purposes of irrigation, and of constructing internal canals, was entirely unknown: neither was it conceived to be possible to turn machinery by any inanimate moving power, either so great or so steady as water; so that the turning of mills may, at that time, have been considered as the most useful national purpose to which water could be applied. That this is not the case, even in the present state of our knowledge, admits of the clearest proof. Let it, for example, be supposed, (which will scarcely be denied) that an ordinary mill-stream, including, on an average, the whole distance of run appropriated to that mill, should be sufficient to irrigate one hundred acres of land; it is admitted, by all those who are in the practice of this mode of improvement, that, merely by this means, land which was not worth more than five shillings, will, in the course of a few years, be made worth three pounds *per acre per annum*. Let us for the present say, that the land was meliorated to the rate of forty shillings *per acre*. In this case, the mill-stream would be worth to the public, or to the owner of the land, which is the same thing, two hundred pounds *per annum*. But it is believed that, taking all the mills in the kingdom,

the average rent afforded for them will not exceed twenty pounds, after deducting repairs, and every other collateral expence conjoined with them. Thus is the public subjected to a loss of no less than one hundred and eighty pounds a year by this mill.

Nor is it necessary that the public should be deprived of the benefit of the mill, even if the whole water should be abstracted from it. For, in most situations, the mill could be worked by steam, nearly as cheap, and certainly with as great effect as by water. It would seem, therefore, that in balancing the case between two claimants for water, one who was to employ it for the purpose of irrigation, and the other for the use of a mill, there can be no reason to hesitate on which side the public weal would require the decision to be made: because, in the one case, the public is not only deprived of a benefit to a much greater amount than in the other; but also, because that loss can be made up by no other device yet known; whereas, in the other case, the loss sustained by abstracting the water, if incurred without any abatement, is comparatively very small; but also, that loss may be easily averted almost entirely, by a substitute that can be put in its place.

That the public would be often more benefited, by employing steam as a moving power, in preference to water, is obvious, from this single consideration ; that where water is the moving power, the peculiarity of the situation necessarily induces a great expence of carriage, which might be saved by a steam-mill being placed in the most convenient situation. Those who advert to the amazing extent of the produce of our fields that is consumed by beasts of burthen, will not think lightly of this consideration.

These observations are thrown out, merely for the consideration of the public, without any intention of desiring that the plan they would suggest should be adopted. But without going these lengths, it is humbly submitted to the public, whether, from these and other considerations, it ought not, among other things, to be enacted, that in every case where an opposition is made, by the owner of a mill, against any person employing the water for the purposes of irrigation, or navigable canals, that he should have no power to stop them, until he should previously have established the following facts by the determination of a jury, and the sentence of a judge consequent thereon ; viz.

1st. That the machinery of his mill is constructed upon such principles as admits it to perform the greatest quantity of work possible, in a given time, with the least expenditure of water: And,

2^{dly}. That the quantity of work he has been in the use to perform for five years back, on an average, has been such, as, upon the best construction of the mill, would have required a quantity of water, though no part of it had been allowed to run to waste, equal to the whole that the stream in question could afford. In case he should fail in these points, and it should be found that his mill, from her faulty construction, or improper position, required more water than was necessary: or that he allowed it, through carelessness, to run to waste; he should, in these cases, have the exact quantity of water ascertained, that would be sufficient, with a mill properly constructed, and where none of the water was suffered to run to waste, to perform the work he had been in use to perform as above; which quantity of water he should have a title to claim from those who diverted the stream for the purposes above named, and no more.

A law to this purpose, it is humbly conceived, would prove highly beneficial to the country ; as it would tend to bring a great many disputed points to an amicable compromise, which must go before parliament at present : for, in the circumstances above stated, neither the miller, nor the person claiming the water, could be *certain* of carrying their point if it came to be litigated ; unless in a case where it was very obvious that one of the parties acted unjustly : but where both parties wished *bona fide* to benefit themselves only, without doing material injury to the other, they would find it their interest each rather to yield a little to what he thought the *strictest* equity ought to grant him, for fear that, in the event of a dispute, he might, perhaps, be cut off with less. Thus insolence on both sides would be repressed ; and that irritation of mind which such a conduct never fails to inspire, would not be felt ; so that the parties would come more kindly together, than when one of them thinks the law views him with a favourable partiality, as at present.

In another point of view, mills have proved a great bar to improvements in some parts of the country. Wherever the practice called

thirlage, (that is, a power authorized by law, to prevent the tenants of certain districts from carrying their corn to be ground any where else but at a particular mill) prevails, it is too often used as an engine of oppression, that proves extremely galling to those who must submit to it. It is a monopoly of a grievous sort, which ought to be most certainly abolished. This could, perhaps, be best done by authorising the owners of such lands as are restricted (or thirled) to a mill belonging to another proprietor, to buy off that restriction whenever he should so incline, at the rate of years purchase, of the annual value which should be found by an impartial jury of honest men, to have been the average amount of such millers for years past.

§ VI.

Farms, of a size inadequate to the circumstances in which they are placed, considered as an Obstruction to Improvements in Agriculture.

FEW questions have been more agitated of late years than that which respects the size of farms : but these disputes have been carried on chiefly by persons who were little acquainted with the practice of agriculture, and who were, of course, unable to judge of the circumstances in which a large or a small farm may become necessary for the arrangements of a judicious economy : which circumstances have, in these performances, been often entirely disregarded. In general the disputants have arranged themselves into two parties, the one of which has argued in favour of *large* farms universally ; while the other has insisted, with a still greater degree of eagerness, that large farms have been the cause of every evil that these persons were capable of perceiving ; and that no salvation remained for the country, but the subdividing these farms, and reducing them once more to those narrow limits which, in their ima-

gination, was the cause of innumerable benefits to our predecessors, that we in the present age are not permitted to enjoy.

It is not my intention to arrange myself under the banner of either of these parties. There are, undoubtedly, circumstances which admit of land being cultivated in the most economical manner, for the purpose of affording human sustenance, when it is divided into very small allotments; there are others in which a farm can never be managed with economy, unless where it is of very large extent; while there are other cases, which require an intermediate extent of bounds, of many different sizes: nor can the country be ever improved to the utmost extent of which it is susceptible, until these cases shall be discriminated, and the farms universally apportioned nearly to the circumstances that would suit the case; but it would require a long treatise to enter minutely into this investigation. All that can be attempted at present, is, merely to give an outline view of the principles that may lead the mind into a train of discriminating the particulars necessary to be adverted to, before a judicious allotment can be made in cases of this sort.

In the essay "*On the Improvement of waste Lands,*" in the present volume, it will be made

manifest, that in scarcely any possible situation can these lands be brought into a proper degree of culture, unless where they are laid out into large farms, or annexed to such: and under the heads, “commonable lands,” and “commons,” in the present essay, it has been shewn, that both these pernicious practices derive their existence from an inadequate smallness of farms; and can never be abolished in a proper manner, till this injudicious partition of land shall be abandoned. The reader is referred to these places for farther satisfaction as to these cases.

In every case where land is poor, and stands in need of lime or other extraneous manure, before it can be fertilized, the farm must be of such extent as to admit of keeping a sufficient number of beasts to labour it in a proper manner,—of sheep, or other domestic animals, in such a quantity as to allow of their being managed in a proper and economical manner, so as to admit of their dung being applied with effect for the production of future crops. To do all this, requires a very large capital: and a man who has a large capital, has a right to expect, and he must have, a comfortable subsistence to himself and family, or he will abandon that occupation. But such a sum as would be necessary for all

these purposes, can never be gleaned from a small extent of the surface of *poor* land. If ever such land is to be *farmed in a spirited manner*; so as to admit of its being rendered more productive than before, or, in other words, *improved*, it must be let out into allotments of a very considerable size: and happy may the proprietor of such lands be, when he can find a tenant of spirit, with an adequate stock, who is willing to sit down upon them; for then, and not till then, it can be put into the train of a gradual and progressive amelioration. If it shall continue in *small* allotments, as it has hitherto done, the tenants must continue a poor and dispirited race, as heretofore, and the land must continue also in a hopeless state of eternal unproductiveness; for every effort to excite a spirit of industry among men in these circumstances, must prove abortive. I specify no particular case of this kind as an illustrative example; but refer to the cases, wherever they shall occur under this predicament, now, and at all future times, as invariably illustrative of this important fact, which has been but too long disregarded in this nation (*b*).

If poor ground, even where no natural obstruction stands in the way of its cultivation, requires for its mere cultivation alone, a large capital and

considerable extent of surface. This becomes still more necessary, where considerable obstructions of another sort are to be surmounted. Where large stones require to be removed—the surface to be freed from obstructive inequalities, and rendered *even* for cultivation; and where draining, at a great expence, must precede every other effectual improvement,—capital becomes still more requisite, and spirited exertions indispensable. These impediments, indeed, can never be removed without it. And to expect to find that the miserable holders of *small* farms of such land can ever be induced to make these necessary exertions, is nearly equally hopeless, as it would be, to expect to gather pine-apples from thistles, or the fruit of the bread-tree from brambles.

Arable land, when even of a good quality, that has been at some former period brought into good order, cannot be so managed as to be kept in that state, and be made to yield nearly its greatest *quantum* of free produce, unless it be let off in allotments, though of a smaller extent of surface than in the former case, and requiring a less extent of capital; yet they must still be in the class that the writers above named would denominate large farms. And if the amount of rent

be to be the rule of judging, perhaps these would require to be even larger than the foregoing ; because a much greater proportion of the produce can, in this case, be allowed to go to rent, than in the other. In every case, where economy in the management of arable land is aimed at, the farm must be of such an extent as to admit of all operations being carried on like clock-work, so as that one operation does not interfere with, or interrupt another ; and they must be so arranged, if possible, as that no variation of weather can lay the operators idle, or prevent the horses from working, when they would not be endangered by going out of doors : but this kind of arrangement can in no possible circumstances be permitted unless where the range is considerable.

When the plough indeed is abandoned, and the ground is so rich as to admit of being cultivated entirely by the spade, the same necessity does not exist for having large farms ; and they may, without inconvenience, and even with profit, be diminished to a much smaller scale. But, even in this case there are limits, above or below which, they cannot be permitted to go, without a hurtful, influence upon economical arrangements. On the one hand, the price of labour is, in this country, perhaps too high in proportion to the price

of grain, to admit of the spade culture being adopted in any circumstances, for the production of corn crops: it must, therefore, be confined to the rearing a few other articles of less general consumption, which never can be accounted of great national moment; chiefly, indeed, to the rearing of esculent plants for the supply of families in towns. Of course, such divisions of lands can take place to a considerable extent only in the near vicinity of towns: and they must be very near, indeed, if the produce can be economically carried to market, or the necessary manures be brought back, without the aid of one horse at least. It follows, that the ground must be of such extent, at least, as to afford constant employment to that one horse and a person to attend him, otherwise a waste must be sustained. This may, therefore, be stated as the least economical division of cultivated land admissible. Its *maximum*, when cultivated in this manner, cannot reach far: for unless the owner himself work with his own hands, or be almost constantly with his labourers himself, while in the field, a want of economy in this department will soon be experienced, that must quickly prove ruinous to the farmer, if so he can be called. At any rate, this kind of diminutive occupation of land must be very much limit-

ed in its *quantum*, so as to be of very small account in a national point of view; and scarcely required to have been here mentioned, except for the purpose of illustration.

The same thing may be said of those small patches which are sometimes occupied by manufacturers, as an accommodation to them in carrying on the particular details of their business respectively. They are to be accounted as mere accidental localities, that are of too small an extent to require particular consideration.

In very light dry soils, that are of a peculiarly rich quality, arable farms may be reduced to a smaller size, with a lesser want of economy, than under any other circumstances: and there may occur situations of this sort, where the advantages that may arise from the minute attention of the occupier, may be such as to counterbalance the inconveniences that arise from other circumstances; or that he may perhaps farm with nearly as great economy, if he keeps no servants, but does the work himself, with the occasional assistance of his wife and family, as if it were let off in larger allotments: but this is the only case I know, in which what would be, by the writers above-named, called *small* arable farms, is possibly admissible; and, these situations are so few in this

country, as still less to deserve consideration in a national point of view, than those above enumerated. In the Netherlands, the soil is in general of this description, and admits of being allotted into smaller farms, than any where else that I know of. In all other cases, cultivable farms require to be of a considerable size; more or less as the circumstances of the case require: and till such lands be put into such kind of occupation, the country can never be put into a state of progressive amelioration; or be made to yield *nearly* the *quantum* of human sustenance, that it is naturally susceptible of being brought to afford.

The produce of rich grass-lands can as seldom be consumed with economy, without the advance of a large capital, as in almost any other case; so that there are few circumstances, except those alluded to above, in which such lands can be properly occupied, in very small patches. Under the dairy management, however, an over-extent may be productive of inconveniences. In the vicinity of towns, lands of this description, like others, admit of being divided into smaller portions, or made larger, than in the country; where alone, farming, in the proper sense of the word, can be said to exist. And there the *mi-*
nimum, even for the dairy, is not of small extent

§ VII.

Inadequate security of Tenure: Improper Conditions under which that Tenure has been granted, and restrictive Clauses in Leases, Impediments to Agriculture.

THE highest benefits that man derives from civil institutions, are safety to his person, and security of property; and human industry is always found to be nearly in proportion to the degree in which these privileges are enjoyed, in every country on the globe. In this island great attention has been bestowed upon this subject; and, in most cases, the property of individuals is so effectually guarded as to prompt them to vigorous exertions: but some cases of great moment have unfortunately escaped the national attention till the present hour.

Habit has a wonderful influence on the human mind, so as to be able to bring it to view objects, with which it has been familiarised from its infancy, with indifference, which it would have beheld with horror, had they been for the first time observed only when man had attained the

full exercise of his faculties in riper years. It is to this circumstance alone, we are to attribute that indifference with which men of sound understanding can view the condition of those who are engaged in agricultural employments in this country, without perceiving the remarkable difference, between the situations of these men, and that of persons in almost every other profession in this kingdom,—in regard to their security of tenure, and the inducements they have to make vigorous exertions in industry, from the hopes of benefitting themselves and families by these exertions—For the tenure of the land they occupy is so flight, and usually for such a short period of years, and they are so much cramped by the terms on which the lands are granted, that an unprejudiced person, who should attentively consider the whole system of conduct pursued by landed proprietors, and the ideas that in general prevail in this respect, would believe that agriculture was an employment which it was deemed to be good policy to repress above all others. Yet so far is this from being avowedly the case, that he hears, from every quarter, that agriculture is the most useful and the most honourable of all employments, and deserves to be encouraged above all others.

Such a discordancy between profession and practice might, by a cynic, be construed to imply a degree of insincerity: but when we look back to the state of society in former times in this island, we are enabled to account for it on a more satisfactory principle. Land was originally let off by proprietors to persons who were in the lowest state of depression that slavery produces, so that to allow *them* to acquire property of any sort, was deemed a favour: and no terms, however hard, could be looked on as severe. Though these ideas, in the most rigid sense of the word, have been greatly moderated, yet it does not seem that they have been entirely obliterated. To this cause I have no difficulty in referring for a solution of the contradictory case above stated (*c*). However this may be, the fact is certain, that in no other profession in this country, is a man, who possesses the same amount of capital, and extent of knowledge, and who bestows an equal degree of attention to business, so much dependent upon the will of others, lives, upon the whole, so poorly, or acquires so little money by equal exertions, continued for the same length of time. ^{marked} those who are in the profession of agriculture ^{are} that

As a proof of this, I wish to refer ^{ever} ^{is} doomed to to the recollection of facts connected to the will of

question, which he himself must know. Is it, I would ask, any thing extraordinary to meet with a man in the mercantile business who set out in life without one farthing of capital, and who, merely by diligence and attention to business, has raised himself into respectability, lives in easy and even affluent circumstances, educates a family in a superb style, and at last, when he dies, bequeaths to them a fortune of many thousand pounds? he well knows that this is no uncommon thing. The same thing is by no means uncommon among those who follow the profession of the law; or the manufacturing line of business; and even some handicraft employments. But though it is by no means uncommon for a farmer to set out in business with a capital of from five hundred to one thousand pounds,—where will he find an instance of such a man, either living in a style of as great elegance as a merchant, who began with scarcely one shilling, or bequeathing to his children as much money as would be deemed a very moderate competency, in a commercial or manufacturing line of business?

If this be so (and that it is so, every person who looks around him must be satisfied) does it not afford the clearest proof that agriculture is forced into an unnatural degree of depression

which it is highly impolitic to continue? let us now, therefore, enquire into the circumstances that tend to produce this effect, and the easiest means of removing them.

Nor will the enquiry be attended with much difficulty, by one who has read the several agricultural surveys: for there he will find, that a great part of the lands, in every county in England, are occupied by *tenants at will*, who may be thrown out of their possession on receiving six months notice, whenever the landlord pleases; that in cases where leases are granted, these generally run from five to seven, or nine years endurance only; and that a very small proportion, not perhaps, upon the whole, one thousandth part of the lands in England, are held under leases of nineteen years duration; which, or twenty one years, may be considered as the *maximum*. And even those precarious leases are full of such restrictions, as tie up the hand of the farmer from ever attempting any essential improvement.

The consequences of such a system of management, on the community at large, are truly deplorable. A tenant at will is not only debarred from all thoughts of making improvements that might benefit the country;—but he is doomed to a state of humiliating abjectness to the will of

another, that degrades the dignity of the human mind: for absolute power, while under the influence even of the best dispositions, tends to corrupt the heart, and lead to abuses that could not have been otherwise thought of. What must it then be, when it cherishes the perverse dispositions of a mind naturally prone to domineer! The question answers itself: the weight of the rod held over the farmer, in these circumstances, must be diminished by mean submissions, and sycophantish adulation: cunning must take the place of wisdom; and the pleasures of life must be enjoyed by stealth, that they may not excite envy: wealth, where it can be picked up, must be concealed under the mean garb of poverty; and a spirit of deception and chicanery, must pervade the whole mass of the people, under these circumstances. Deplorable, indeed, must be the state of the nation, where the *country people*, who, of all the classes in the state, ought to be naturally the most virtuous and upright, are driven, from necessity, to shelter themselves under subterfuges that are so deplorably degrading!

Under a tenure of seven, or of nine years, the case is little bettered. If the tenant shall make an attempt to render the land more productive, it has only a tendency to bring others forward to

offer a higher rent, that they may be permitted to reap the fruits of that enlarged crop which has been sown by another; so that the man who ventures to put himself under such a predicament, must experience a state of perpetual disquietude, which prudence requires him to avoid, by refraining from all such *injudicious* attempts: for in his situation, assuredly, every expenditure that tends to insure a permanent improvement, must be accounted injudicious.

On a nineteen, or twenty one years lease, the case is a little, and but a very little altered. In the former cases, no improvements can be attempted. In the present case, a few may be gone into: but even these must be carried on upon a system that is extremely uneconomical, and eminently productive of national loss. It is well known by every skilful farmer, that land, which is in a poor and exhausted state, in consequence of improper management, cannot be put into a proper productive state, without the expenditure of a considerable sum of money, and the lapse of much time; but that when it is once put into a good and productive state, it may, by a cautious conduct, and judicious mode of cropping only, be continued in that condition for any length of time, without expence. Thus,

the tenant, under such a tenure, is subjected to the necessity of making a great expenditure at first, in order to bring his land into good order, which never would have been necessary, if it had not been for the exhausting mode of cropping that his predecessors has adopted; and which he himself will assuredly adopt towards the end of his lease, that he may get some return for the money he was obliged to expend towards the beginning of it. By these manœuvres, the land is never, even at the best, brought nearly to the highest degree of productiveness of which it is susceptible: but even that moderate degree of fertility which it does thus acquire, it is only allowed to possess for a very short period of the lease; so that the total *quantum* of produce, even when under this management, is wonderfully short of what it easily might be.

Under this mode of management, however, a phenomenon occurs, which is not experienced where the lease is of shorter endurance. The landlord has an opportunity of observing, that his ground is capable of being brought into a degree of productiveness of which he never could have suspected it was susceptible, under the other arrangement. And when he sees it once more brought back to its former state of sterility, he

becomes also sensible of a deterioration he would not otherwise have remarked. This circumstance, it is to be feared, in too many cases, prejudices him against this kind of lease, which puts it in the power of the tenant to operate such an obvious deterioration; and he is better pleased with those shorter leases, under which any thing of this kind must be far less obvious. He forgets that that very fertility, which is thus taken away, was added to the land at a former period, by the exertions of the farmer: that it only has out-run the land farmed under short leases, for a short period, and returns again to the same pitch, perhaps, nearly from which the former never departed. But not satisfied with curtailing the duration of the lease, the landlord finds, that, to prevent the total deterioration of the land during the prevalence of that insecure tenure, it is necessary to bind the tenant to certain prescribed modes of management, which the weakness of our predecessors, at some former period, or the vanity of their successors, of the present day, had made them believe were the most perfect that could be devised. The consequence is, that, however deficient these regulations may prove in preventing deterioration, they are found to be sufficiently efficacious in preventing the

introduction of those more perfect modes of culture, which the ingenuity of man, when put into proper circumstances, would very quickly devise.

While I thus trace, with a painful minuteness, the rise and progress of a malady that has been productive of miserable consequences to this country in general, and to which it, therefore, becomes the business of every man in the community to advert, yet I wish, in a particular manner, to call the attention of gentlemen of *landed property* to this subject; because, of all others, it tends the most immediately to affect their own particular income.

It must, in the first place, appear evident to every considerate mind, that the slavish dependence which a tenure of the nature explained above must produce, will necessarily drive away, from the profession of agriculture, every young man of spirit, ambition, and native energy of mind; who will rather choose to engage in some other employment, in which there is a better prospect of availing himself of his talents and industry. And that this actually does take place, is a deplorable truth, too notorious to be farther insisted on in this place.

A necessary consequence is, that those who remain behind, are of a torpid languid frame of

mind, which is rather disposed to sink into indolence, than to spring forward into active exertions ; and the situation in which they feel themselves placed, as naturally tends to augment this torpor, as the light of the sun tends to produce a shadow. Why then should we be surprised, in these circumstances, to observe, that the progress of agriculture is so nearly stationary ; and that so many among this class of men, should be contented with blindly following what their fathers have done before them ? This surely ought to excite no wonder : but the thing which is truly wonderful is, that, under these circumstances, there are still *some* men to be found, who can be brought to submit to the hardships they are doomed to suffer in that situation, without abandoning it yet more than has been done ; and that there are still some rare individuals to be met with among them, who have made some faint attempts at improvement. This phenomenon can only be accounted for by that instinctive bias which the Creator seems to have impressed on the human mind, in favour of agriculture, rather than any other occupation, seemingly for the purpose of producing food at all times for the subsistence of the human race ; nearly of a similar nature to the instinctive appetite for sex

and for food, so universally conferred on animated beings, for the purpose of preserving the individual in health, and preventing the species from being annihilated; and which instinctive calls are so powerful as not to be subdued by any other means than the extinction of life itself.

It will not be alledged that the agriculture of this country has yet been carried to the highest perfection of which it is susceptible. It will be admitted by every one, that there is as much room for improvements in this branch of business, (perhaps more) as in any that can be named: it will not be denied, that there is as much scope for spirited exertions here as in any other walk: why then should men of spirit be banished from it? Money is universally allowed to be absolutely necessary for carrying on its operations properly:—why then should a constant attempt be made to keep the occupier of land poor? There is as much scope for the exertions of a sound understanding here as in any other profession, had it room to operate with freedom; and that understanding, if fully exercised, would discover a greater variety of resources for augmenting individual wealth, and national treasures; in this than perhaps in any other employment:—why then should barriers be every where thrown

in its way to prevent the full and free exercise of its powers? This miserable system of regulation and restraint, has been followed long, very long, after its futility has been fully demonstrated:—why then should it not be abandoned? The welfare of the public demands it; but the interest of landed gentlemen demands it in a still more eminent degree: for, where the public receives a benefit from agricultural improvements in an arithmetical *ratio*, the proprietor's income will be augmented in a *geometrical* proportion nearly.

This assertion will appear paradoxical to those only who have not adverted to this subject; for those who have adverted to it, know well that no rent whatever can be afforded from *cultivated* land, until the produce exceeds the expence of rearing it: and as that expence is in all cases as great in poor land as it is in rich land, (usually greater) it follows, that a considerable proportion of the crop must, in all cases, go to payment of the expences. Let us, for example, say that twelve bushels *per* acre is just sufficient for the expence of cultivating, and no more. If so, no rent whatever can be afforded for *cultivated* land that yields only twelve bushels. But suppose the fertility of the land is increased to thirteen bushels; the farmer will be very well pleased to give

half a bushel by way of rent. Suppose, again, it is brought to yield twenty bushels; the farmer will be content to pay to the landlord six bushels by way of rent. Say it augmented to twenty-six; the farmer will be willing to pay ten, or more, to the landlord. Here then the produce, by being only once doubled, from thirteen to twenty-six, the rent has been augmented twenty-fold: and nearly the same *ratio* will hold in every other case. If gentlemen were, therefore, to consider the case with attention, they would find it much more *their* interest, than perhaps even of the farmer himself, to promote the prosperity of the farmer, and to encourage him to push his improvements still forward without any abatement; because the greater amount the produce can be brought to, the greater will be the proportion of *free* produce; and the greater the amount of that free produce, the greater will be the proportion of it that the proprietor will draw by way of rent.

Thus, in the example above stated, when the amount is thirteen bushels, the free produce is one thirteenth; and the landlord's rent is only one twenty-sixth of the total, or one half of the free produce. When, on the other hand, the whole amount of the crop is twenty-six bushels,

the landlord's rent is *ten* twenty-sixths of the whole produce ; or about $\frac{2}{3}$ of the free produce ; and although the tenant's profits would, in this last case, when compared with the first, be as 8 to 1 ; yet the landlord's profits would be augmented as 20 to 1. The profit to the public, in this instance, would be as two—to the tenant as eight—and to the proprietor as twenty to one. It thus appears, that, of all the parties concerned, it is most the interest of the *landlord* to promote improvements ; for it will be found, that in every case where there are two fields, the produce of which are nearly as above stated, without requiring any immediate outlay for their improvement, the farmer would willingly pay even more rent than is there specified, for the last ; though he could scarcely give so much for the first. Yet it cannot be expected that, if the superior produce has been immediately occasioned by his own outlay of capital, and exertions of industry, he can pay nearly the same *proportion* of it as rent : but after the land has been for some time in a permanent state of fertility to that degree, though it even originally derived that fertility from his own industry, he will be content to pay such a proportion of rent as is here stated, *if no other deductions* are to be taken from his free produce.

It is, therefore, greatly the interest of the proprietor, that the profits of his tenant should be thus augmented; for, in this way, his own rents will be augmented in a much higher degree.

It is upon these principles that I beg leave warmly to recommend to gentlemen of landed property, the plan of a lease devised by the late Lord Kaimes, which seems to me to be perfectly calculated for putting the landlord and the tenant on such a footing, with regard to each other, as is liable to no objection that I can see; for, while it gives entire freedom to the exertions of genius and sound understanding, it is perfectly well calculated to excite the farmer to make continued exertions to forward his improvements, and, at the same time, insures to the landlord the certainty of receiving an adequate rent for his land, under every possible situation of things.

His Lordship proposed that the lease should extend to an indefinite number of years, consisting of fixed periods, at the end of each of which a rise of rent should take place; with permission for the tenant, at the period of each of these rises of rent, to give up his farm, if he shall see proper; and granting a similar power to the landlord, upon proper terms, to resume his land

if he shall think fit. The particulars of this contract, and the grounds on which they rest, are as under.

Lord Kaims assumes it as a postulatum, that a landlord and tenant are capable of forming a tolerably just estimate of the value of the land in question, for a short period of years, such as it is customary to grant leases for in Scotland: say twenty-one years. And having agreed upon these terms, which, for the present, we shall call 100*l.* rent, the tenant expresses a wish to have his lease extended to a longer period. To this the proprietor objects, on this ground, that it is not possible to form a precise estimate of what the value of the ground may be at the end of that period. He has already seen that ground, for the last twenty-one years, has encreased much more in value than any person at the beginning of that period could easily have conceived it would have done; and therefore he cannot think of giving it off, just now, for a longer period; as a similar rise of value may be expected to take place in future. This reasoning appears to be well founded; and, therefore, to give the landlord a reasonable gratification, he proposes it should be stipulated, that if the tenant should agree to give a certain

rise of rent at the end of that period, suppose 20l., the landlord should consent that the lease should run on for another period of twenty-one years; unless in the cases to be after mentioned.

But as it may happen that this 20l. now stipulated to be paid at so distant a period, may be more than the farmer will find he is able to pay; an option shall be given to the tenant to resign his lease, if he should find this to be the case, by giving the landlord legal notice, one year at least, before the expiration of the lease; but if that notice be omitted thus to be given, it shall be understood that the tenant is bound to hold the lease for the second twenty-one years, at the rent specified in the contract. And if the landlord does not give the tenant warning within one month after the time that the tenant ought to have given warning, if he was to remove, it shall be understood, that he too is bound to accept of the stipulated additional rent for the twenty-one years that are to succeed.

It may, however, also happen, that the sum specified in the lease may be a rent considerably below the then present value of the farm: or the proprietor may have very strong reasons for wishing to resume the possession of that land, or to obtain an adequate rent for it. A power,

therefore, should be given to him, in either case, to resume the lands, if he should so incline. But as a great part of that present value may be owing to the exertions of the farmer, who has laid out money upon the farm, in the hopes of enjoying it for a second period of twenty-one years, it would be unjust to deprive him of this benefit, without giving him a proper consideration for that improved value. On this account, it should be stipulated, that in case the proprietor at this time resumes the farm, he shall become bound to pay to the tenant years purchase, (Lord Kaimes says *ten*, I am inclined to think that *five* might be sufficient) of the additional rent he had agreed to pay; which, in the example above stated, would be 200*l.* if *ten*, and 100*l.* if five years purchase were allowed.

But the land may be worth still more than the 20*l.* of rise mentioned in the lease, and the tenant may be content to pay more, say 10*l.*, rather than remove; and he makes offer accordingly to do so. In that case, the landlord should be bound either to accept that additional offer, or to pay *ten* (or five) years purchase of that sum also; and so on, for every other offer the tenant shall make, before he agrees to remove from the farm.

In this way, the landlord is always certain that he can never be precluded from obtaining the FULL value for his land, whatever circumstances may arise. And if the tenant shall prove disagreeable, so that he would wish rather to put another in his place upon the same terms, it never can be any hardship upon the landlord to pay the stipulated sum; because it would be the same thing to him, as if he bought a new estate at TEN OR FIVE years purchase, as the case may be, free of taxes: a thing he never can expect to do. It is, indeed, true, that it would be more advantageous for him to allow the present tenant to continue, than to force him to remove: and therefore this alternative will be always, unless in very extraordinary cases, accepted of, as it ever ought to be. Thus will the tenant's mind be impressed with a conviction that he will continue in his possession: a conviction that ought ever to prevail, because it stimulates to industry in the highest degree.

And as the tenant is thus certain, that, at the very worst, his family must be entitled to draw a reasonable remuneration for the exertions of his industry, he can never find the smallest tendency to slacken his endeavours in any way.

By stipulating in the original lease, in the same manner, that at the end of the second twenty-one years, the lease shall be continued for twenty-one years more; and so on at the end of the third, and fourth, and any farther number of periods of twenty-one years, on agreeing to pay a specified rise of rent; reserving to each party the same privileges as above described, the lease might be continued to perpetuity, without either party ever being in danger of having an undue advantage over the other. The tenant will always be certain of having a preference given him over every other person, and will, of course, go on with unceasing exertions to better his land, which will of necessity tend to augment the income of the proprietor, much more than could have happened under any other system of management.

Such are the outlines of that plan of a lease that his Lordship has proposed. By this plan, the tenant's hands are not tied up by restrictive clauses dictated by ignorance, under the pretext of securing the interest of the landlord. His interest is secured in a much more effectual manner, while the tenant is left at full liberty to avail himself of his knowledge, his skill, and his industry. Instead of ceasing to begin any arduous undertaking, as he ever must

do where he has no lease ; or of beginning to improve for a few years only, at the commencement of his lease, but stopping in a short while in the midst of his career, and then running it down to the same exhausted state as it was at its commencement, he continues to push forward without ever stopping ; and advances even with an accelerating progress, for an endless period of years. No person, but an experienced farmer, can conceive the difference that would be between the productiveness of the same land, under this management, at the end of a hundred years, and what it would have been, if let even for detached periods of twenty-one years each. In unimproved waste lands, the difference would approach to infinity. In lands which were originally very rich, the difference would be less considerable : but, in all cases where cultivation could take place, the difference would be very great (*d*).

It is worth remarking here, also, that if this arrangement were adopted, a new order of men in civil society would be created, different from any that at present exists. They would be inferior in point of rank, to that class of men who are called *gentlemen*, and superior, in point of wealth and energy, not only to the present

order of *farmers*, but even to that class of men who are called *Yeomen*. The peculiar political advantage, attached to this order of society, would be, that while their exertions would always insure affluence, that affluence never could become such as to permit them, by imitating the life of the higher orders, to neglect their own proper concerns; for the moment they did so, their exertions in business would become slackened; in consequence of which, they could not afford such a rent, as others around them would be willing to give, and so they must quit their lease.

Here we are led to perceive the most essential difference, between *thus* granting, what may almost be called a perpetual lease, and every other *long* lease that ever yet has been tried: for in all other long leases, if the rent stipulated at first shall prove to be at last inadequate, and the holder of the lease be reduced to poverty, by dissipation or otherwise, he may neither be able himself to cultivate the ground properly, nor can another be permitted to do so; and by this means the proprietor may not only be, for a long period of years, deprived of an adequate value for his land; but that land, also, being locked up from improvement, may be doomed long to remain in a degree of comparative sterility. Nothing of that kind could

here happen. It differs also very much from that sort of tenure which is called yeomanry; in which their small capital, which, if properly applied, would have been just sufficient to give scope for agricultural exertions, by being locked up on the original purchase of the land, deprives the possessor of the only funds he had in his power to apply for improving his land. Instead of active exertions, and chearful affluence through life, he is thus stinted in every exertion; and is doomed to a perpetual hard struggle against the harassments of poverty. In short, either as a proprietor or a tenant, I should choose to let or take land upon these terms, in preference to any other I have ever heard of (*e*).

Several little clauses have been overlooked by his lordship, which it would be necessary to advert to. Some provision ought to be made respecting trees on a lease of this kind,—as it is probable the tenant might find it convenient to plant, which, by the common law of Scotland, he cannot do at present, with a view to profit. Perhaps the wood, if any was on the farm at the time of his entry, ought to be valued, and he should be bound to leave at least an equal value upon it, or pay the balance. Whatever timber trees he himself had planted, he should be at li-

berty to cut at pleasure, for the use of the farm, unless it were such individual trees as the landlord, from situation, or other causes, should think proper to mark for reservation. He should also have permission to fell such trees as he inclined, unless as above reserved, or during the last six years of any of the twenty-one years of the lease. But in case of his removal, the proprietor should either permit him to fell the whole trees that were over the value of the stock at his entry, or take the whole, or such part as he chose to reserve, at an appreciated value. In case of his removal, also, the tenant should be bound not to out-labour the ground during the last six years of the lease, or to crop it improperly, or to carry off any straw or dung; otherwise to pay the damages that should thus accrue to the landlord, at the estimate of two honest men, to be mutually chosen: and to leave the houses in a habitable condition, and the fences in good repair. There seems to be no other clause necessary in such a lease.

I am happy to be able to add, that, since the former edition of this work was printed, Thomas Johnes of Hafod, Esq. member of parliament for the county of Cardigan, in South Wales; has actually let two large farms on the plan here recommended, and as all the clauses

in this lease have been revised with great attention by many impartial persons of knowledge, with a view to avoid every inconvenience that might accrue to either party, as far as these could be foreseen, it is to be hoped that every objectionable particular will be obviated in this lease. I have no doubt but Mr. Johnes, who is actuated by a warm desire to promote the welfare of his native country, will not object to the publication of this lease, that others may have an opportunity of benefiting by it.

§ VIII.

Want of Capital among Farmers, an Obstruction to the Progress of Agriculture.

THE want of capital among farmers, is experienced to a very great extent, in almost every part of this island; but the effects of that want can only be known, by comparing those districts where the evil has been in part remedied, with those where the malady still prevails to its full extent: a comparison that few individuals have an

opportunity of making ; and a fewer still have adverted to circumstances so attentively, as to be able to trace the causes and consequences of this disease.

Every person knows, that if a man shall attempt to grasp at an extent of trade or manufacture, beyond the reach of the capital he can command, he must do it with such an enormous disadvantage, as to be involved, in a short time, in certain ruin. The reason of this is, that he has to cope every where with rivals, whose extent of capital gives them such a decided superiority, in regard to purchases and sales, as to knock down all competition. Were all these great capitals withdrawn from those branches of business, this competition would indeed be removed, and the poor trader, or manufacturer, would then be suffered to exist ; but his efforts would be feeble, and their effects inconsiderable, in proportion to the weakness of his means : for innumerable obstructions, that must at once give way to the energetic powers of the one, will oppose themselves as irresistible barriers to the feeble exertions of the other.

The case is exactly the same in regard to agriculture. Let two farmers, equally alert, skilful, and industrious, the one of whom has a commanding power of capital, while the other is

stinted in his circumstances, be set down upon two contiguous farms of equal quality in all respects; and observe the result. While the first, in consequence of his being able to avail himself of every favourable circumstance that occurs, can obtain every article he wants at the cheapest rate,—can purchase such manures as may be wanted, to enable him to make all such operations as he sees necessary for meliorating the soil, exactly, in the most favourable season for it, at the beginning of his lease, and can procure servants and labourers in such abundance, as to carry on his operations without waste of any sort, and at the cheapest rate; the other must have the mortification to see the most favourable opportunities pass, without being able to avail himself of them:—must only purchase manures when he can, not when he would:—must let slip the most favourable opportunities for obtaining a great profit:—must postpone the necessary improvements, because of inability to perform them:—must content himself with only such a number of servants and labourers as his limited funds can reach, many of whom are those rejected by the rich farmer; and they must, besides, labour to great disadvantage, because they are thus thrown into uneconomical arrangements. In consequence of

this variation of circumstances, while the rich man carries his farm, at once, forward to a great degree of productiveness, which is augmenting from year to year, so as to permit him to pay to the landlord a high rent, while he himself lives in plenty and comfort,—the other pines on in poverty, because of the unproductiveness of his farm, and the unavoidable waste which that occasions; and he can afford, with the utmost difficulty, a very small sum to the landlord by way of rent, which is often squeezed from him, by means that an honest heart would not adopt, could they be fully known to the persons concerned.

I have put the case above, more favourable for the *poor* farmer, than it can actually be in practice, by supposing that he has equal skill, equal industry, and the same energy of mind, as his rich neighbour: but this is a case that can seldom occur. The mind, struggling against misfortunes, loses its energy; and it possesses neither the means, nor even the wish to attain knowledge, that the successful improver enjoys; whose mind, alert in the vigour of successful exertions, springs forward with alacrity to catch every hint, which promises to add to that capital which he has the satisfaction to find is daily encreasing.

It is easy to see, from what has been just said, that a farmer, with an inadequate stock, must less stand a competition with farmers around him, who have sufficient capitals, than a merchant or manufacturer can do ; because, in consequence of the nature of the transactions of these last, artificial credit can be much easier procured by them, than by the farmer. It, therefore, invariably happens, that wherever circumstances have enabled the farmers, in general, to acquire an adequate capital, a person attempting to farm among them, without being in similar circumstances, is instantly reduced to beggary ; because the rent that his neighbours around him are willing to pay, is far above the standard that he is able to reach.

Such, however, is not the case in those districts where the miserable policy of the landlord has been calculated to deprive their tenants of the means of acquiring that wealth, which alone can produce independance and energy. In such districts, the tenants being all nearly in equal want of means, keep each other in countenance : they live in a deplorable state of inaction ; and pay to their landlords a pitiful pittance in name of rent, which a rich farmer would account a mere trifle for such land. Every improvement,

in such a situation, is precluded, because of want of power to remove obstructions. Roads must be bad, however burthenfome to the tenants; because they neither know how to make them, nor have the power to do it, if they would. The harrassments they frequently suffer on this account from parish officers, in consequence of indictments, often equally merciless and injudicious, take off their attention from the operations on their farms, and render their weak exertions still more feeble. To ward off these evils, recourse must be had to suppleteness, chicanery, and cunning. The landlord, if a man of extensive property, is cheated and deceived: but he is treated with an abject kind of servility by them, that a man of capital would disdain to adopt. No man of that description will submit to conditions which *they* readily agree to; so that there is little danger that a man of sufficient capital, will easily be induced to become their rival in their own districts, so long as the same mode of management shall be suffered to prevail among them.

I am sorry to observe, that these necessary effects of the operation of wealth, in the hands of farmers, should have been so little adverted to by men of landed property in this island as they

hitherto have been, the effects of which have been truly deplorable ; and I should consider myself as performing a very meritorious part, if I could flatter myself with the hope of being instrumental in now directing their attention to this object. I own that I see, with much concern, many efforts made by well meaning men, to promote agricultural improvements, which I know must ever prove unavailing, so long as this circumstance shall be disregarded. With a view to produce conviction, I avoid entering into abstruse reasoning of every sort ; and only wish that gentlemen will open their eyes, and attend to facts that must every day fall under their observation, if attentive ; and draw their own conclusions from these, without prejudice of any sort. If gentlemen have property in remote districts where tenants are poor, let the native staple of the soil be what it may,—I only desire, that they will look at the rent they draw for their lands, and compare it with that which is given for lands of the same extent, whose soil is not intrinsically better than it is in those districts, if they know any such, where the land is farmed by men of substance in general : and I have no hesitation in saying, that they will find the difference astonishingly great. I must, however, beg leave to put

them on their guard against one circumstance that may induce them to make a fallacious conclusion; which is, that in comparing the soil of the two districts, they will advert to their former state, rather than their present condition: for if the practice of agriculture has been spirited in the one district, for a number of years backward, that soil, which was originally poor, will now have become highly productive; and, of course, is capable of affording a rent greatly higher than it ever could, if it had remained all that time under the management of the *poor* farmers.

I shall beg leave to give one example of the truth of what I now say, by stating facts which any one, who will take the trouble of examining the case, will find no difficulty in verifying.—Nor can I help regretting, that I should, on this occasion, find it necessary to call the attention of English proprietors to Scotland.

It has happened, in consequence of a concurrence of circumstances which may be gathered from the general tenor of this Essay, that the farmers, in some districts in Scotland, have been enabled gradually to acquire, during the last forty years, an adequate stock for the purposes of agriculture; in consequence of which, the land, in these districts, has been meliorated to a degree

that no man at that period, could have believed possible ; and the rents have risen with that melioration, to a height that astonishes the proprietors themselves ; who, unable to form any conjecture at the rise which will be given them at every renewal of lease, are forced to leave the tenants themselves to name it,—as they thus obtain much more than they could have a face to demand. During the currency of the year 1795, many farms have thus been let in East Lothian, at rents much beyond what any person, a few years ago, could have dreamt of. Whereas, in other districts, where wealthy farmers do not yet abound, landlords find difficulty to let land, of a soil intrinsically as good, at less than one fourth part of the rent which is there readily given for it.

In regard to the improvement which time produces on land, when under the management of farmers who have capital, and who have not their hands tied up by injudicious restrictions, I would refer the attentive observer to East Lothian and Berwickshire, where he will find many thousands of acres, which, from ten to forty years ago, carried nothing but heath, and that of a very poor quality, now producing abundant crops of wheat, and every other kind of grain that the

climate can ripen, with grafs and green crops of all kinds. It was in consequence of these crops created by the efforts of industry, that Scotland, which not many years ago scarcely produced any wheat at all, was able last year, not only to supply her own consumption, but even to send considerable supplies to England. There is one farm, in particular, in Berwickshire, which, less than forty years ago, was rented at thirty pounds, which is now let for three hundred pounds a year. The improvement of this farm has been effected entirely by the exertions of the farmers, who became much more wealthy towards the end than at the beginning of that period. It is reckoned at present rather low rented than otherwise.

Let these facts be attended to: they speak a language that ought to rouse every landed proprietor in the island from that destructive dream which has deluded so many of them for ages. Let English landlords advert, that while England, which possesses a richer soil, and finer climate than Scotland, was labouring under a scarcity that raised the price of wheat, to a rate unexampled in modern times, Scotland had plenty, and to spare: that while the one part of the

kingdom is rapidly progressive, the other is rather retrograde in agricultural exertions; owing chiefly to this circumstance, that from chimerical notions, which have been sucked in with their mother's milk by men of landed property, and injudicious fiscal regulations that have been tolerated in consequence of it, they have contrived to banish from their domains, spirit, energy, and capital, among farmers; and thus to lessen the value of their lands, and to diminish the produce of the country to a most deplorable degree.

§ IX.

Inclosures, considered as an Obstruction to Agriculture.

I AM aware that public prejudice runs at present so high in favour of inclosures, that what I have to offer under this head, runs a risk of being received with very little favour. Indeed, inclosures are so far from being suspected in any case to be a retardment to agriculture, that men, in general, seem to think, that the inclosing and the improving of ground are synonymous terms; it

seems to be considered by them as a magical circle, which, if once drawn round their fields, encreases their produce to an astonishing degree, so that, if the lands be only inclosed, scarcely any farther improvement can be wanted.

I do not, however, complain of inclosures *universally*, as being an obstruction to agriculture. All I mean to insinuate is, that simply inclosing of land cannot be accounted such an essential branch of improvement as is commonly supposed; and that, under certain circumstances, inclosures may become pernicious.

When land is to be kept under corn crops, inclosures can be of no other use than to prevent the corn while it is growing, or the ground after the corn is removed from it, from being hurt by trespasses from cattle getting upon it. A ring fence therefore, around a corn-farm, strictly so called, seems to be all the fence that can be wanted for such; and even that, where it marches with an adjoining farm of the same sort, appears to be unnecessary. But if it should be admitted that it might be in some sort desirable, on account of the neatness and comfort fences seem to afford: it would become merely a matter of calculation to a strict economist, whether the benefit to be derived from them, would repay the expence at

which that benefit must be purchased; or whether the fence was actually capable of affording that benefit.

In some measure to ascertain this point, let us suppose that a farm, consisting of an hundred acres of good corn land, *uninclosed*, was put under the management of one who was desirous of making the most of it;—the question is, should he continue it so, or divide it into small inclosures?

In its present state, we shall suppose it such as that, on an average, it yields a crop equal to twenty-four bushels of corn *per* acre; of course the hundred acres will produce two thousand four hundred bushels, or 300 quarters of corn *per annum*.

If this field were inclosed in the usual manner, and divided into thirty inclosures; (and this is more than the average size of inclosures in many parts of England and Wales:) let us now see what would be the amount of the crop, supposing the quality and condition of the ground to be the same as before. And that the case may be as favourable for the enclosures as possible, we shall suppose it to be a regular four-sided field, consisting of thirty chains in breadth, and thirty three chains and one third in length; and that it was divided into five divisions the short way, and six

the other. The whole fences in this case would measure 430 chains; or 9460 yards.

I find that the most usual kind of fence in England consists of a mound with a ditch on each side. This mound, we shall suppose, is eight feet wide at the base, with a ditch of four feet on each side; which is eight feet more. In plowing ground, it is well known that the plough can seldom come within less than two feet of the side of the ditch, which makes four feet more of ground abstracted from tillage,—in all twelve feet, or four yards of ground lost, for every yard in length. Of course, 9460 yards multiplied by four, gives 37,840 square yards; which is eight acres and a half nearly. Thus is the hundred acres of arable land with which we set out, reduced to ninety one and a half only; and the produce, of course, is diminished, to the amount of $25\frac{1}{2}$ quarters *per annum*; which, at the rate of 32 shillings *per* quarter, amounts to 40*l.* 16*s.* *per annum*. If the inclosures were of a smaller size, the proportion of ground wasted would be the greater; and if it were of a richer quality, its value would be farther augmented, as is most evident.

Again,—suppose that, at an average, the expence of inclosing, securing, cleaning, &c.

amounts to the rate of one shilling *per* running yard; the sum that must be thus sunk on 9460 yards will be 473l.; which, at the rate of 5 *per cent.* only, amounts to 23l. 13s. *per annum.* This is, supposing the inclosure to be made by the landlord, he would require this much additional rent to make up his loss. But if the tenant shall make the inclosure, it will swallow up so much of the capital that ought to have been laid out on other modes of improvement, as to retard his operations in an amazing degree. It will be a moderate calculation to suppose, considering his short tenure, that money expended by him on improvements ought to have returned fifteen *per cent.* In this case, the annual loss actually sustained by the farmer, and virtually by the public, will be no less than 70l. 19s. under this head. These two sums, when added together, make £111. 15s. *per annum*

To this must be added, the sums expended in annual repairs of fences; and the loss that the farmer incurs, in consequence of the seeds of weeds being blown from among his fences into his fields; and the destruction done by birds and other vermin, that find shelter in the hedges: which three articles, not to mention the loss from waste labour in plowing, where the inclo-

fures are small, and of an irregular form, will do much more than counterbalance any little benefit he may derive from the loppings from the hedge, and the pickings of grafs he obtains from the hedge sides ; so that the supposed benefit that is derived from the mere preventing intrusions from cattle, is purchased at the price of more than at the rate of twenty shillings *per* acre for arable land. Can any damage it might be supposed to sustain from the want of fences, in any case, amount to one fourth part of this sum ? And, after all, these are only *nominal* fences over the greatest part of England : for I will venture to say, that there is not one inclosure in a hundred that is a compleat fence all round. For the most part, the mounds are only useless cumberers of the ground, and nurseries of weeds and vermin, which consume and greatly diminish the amount of the produce of the land. Nothing but inattention, arising from the prejudices which mankind imbibe in their youth from the conversation of men whose minds have been biased in the same manner, could prevent such obvious considerations from being adverted to. How many millions of acres of inclosed land are there in the kingdom, whose whole rent does not amount to the half of twenty shillings *per* acre ? Were

I to attempt to make an estimate of the total amount of the encreased products of land, that might have been produced by a judicious outlay on solid permanent agricultural improvements, of the sums that have been expended on useless inclosures which have been made in this island, within the space of two hundred years past, the amount would be so great as to appear to be incredible. For this reason, I omit it here. My object here, is not so much to estimate the losses we have already sustained by a blind adherence to ancient customs, as now, that the evils arising from these causes are felt, to direct the attention of the public to such circumstances as may tend to ward off similar evils in time to come ; and I shall be happy if any thing I shall here say, shall tend to make the subject of inclosures only an object of deliberation. In that case, men will soon discover other facts, which I think it here unnecessary to bring forward, that will furnish additional arguments for hesitating with regard to their utility. As I shall, perhaps, have occasion to resume this subject, where it will have occasion to be considered under another point of view, in an essay intituled Considerations on the most economical mode of consuming the produce of a farm,—I shall not prosecute the subject farther

in this place ; but refer the reader to that essay for farther satisfaction respecting some doubts which will naturally occur to his mind on this occasion. Here I shall only observe, that whatever annihilates a considerable proportion of the best lands of the kingdom, as inclosures may justly be said to do ; and abstracts from the purposes of productive melioration, a large proportion of the capital appropriated to agricultural purposes, as the erecting of fences undoubtedly does ; ought certainly to be productive of benefits that are by no means problematic : for the evils originating in this source, are at first sight obvious, and of great magnitude.

§ X.

Church-lands, Lands in Mortmain and Entails, considered as an Obstruction to the Progress of Improvements.

CHURCH lands, and other lands in mortmain, prove a much greater obstruction to the laying off of roads and canals, or making exchanges for the mutual accommodation of parties, than lands

equally circumstanced belonging to individuals ; inasmuch as they are more unalterable by any person existing : for though all the parties should be sensible of the utility of the proposed change, and willing to agree to it ; yet it is doubted, if any authority, short of an act of parliament, can make a change that is not liable to future challenge. In other cases, too, when a property is small, it frequently happens that one or other of the proprietors who hold it, become willing to sell it in the course of no long tract of years ; so that the inconvenience resulting from these troublesome holdings is gradually done away : but when such small property is in mortmain, it becomes a perfect nuisance to the neighbourhood. It may be compared to one of those incurable wens that sometimes grow on the human neck, from which there is no hope of deliverance, but by death itself. No leases of a proper kind for promoting industry, can be granted upon such lands ; and they must remain small, detached, unimproveable patches for ever.

It is by no means my wish, to make unnecessary encroachments on the property of the church, or of any other individual whatever :— but where evils that affect, in a strong degree, the community at large, have been the result of

a combination of circumstances that were not foreseen at the time when the institutions from which they sprang were adopted; it would argue a great want of understanding to say, that no attempt should be made to remove those evils when they come to be severely felt by the public; although, in every attempt of this sort, as much care as possible should be taken, that those regulations which public convenience call for, should not tend to hurt the private interest of individuals.

On that principle I would humbly beg leave to suggest, as a matter for consideration by the public, whether the inconvenience complained of, in regard to this particular, may be removed, and the holders of lands in question be at the same time benefited, merely by a law authorising such lands to be sold under proper regulations: or, if this were deemed too great an innovation, by permitting all patches of such lands, being disjoined property, if not exceeding in yearly value the sum of l. to be sold by public auction, under due forms; and requiring that the money arising from such sales, should be vested in the public funds; the interest of such sums to be applied, in all time coming, to the same purposes as those to which the rents of these lands, held in mortmain, are at present allocated.—

Many would be the advantages that would thus result to those having a right to these funds : for it is a truth well understood, that the rents drawn for such lands at present, are, for the most part, very much beneath their real value. And, under pretext of repairs, dilapidations, arrears, and charge of management, prodigious abatements must be made from the gross rents. From facts that have come to my knowledge, I think it would be a moderate estimate to say, that, taking all the mortmain-lands of this description in the kingdom, the free income drawn by those who have a right to it, is not above one half of what the gross rent of these lands would be, at the present moment, if they were let on leases of a proper sort ; and are less than one fourth part of what it might be brought to in a very short course of years, if under a judicious management. The inference I draw from this fact is, that were these lands sold, they would in general bring a much higher price in proportion to their present rent, than other lands in the vicinity : partly on account of the profit that a person may hope to derive from becoming owner of a small bit of property, and partly on account of the desire that the great landed proprietors beside them would have to acquire these lands. When that money

was thus acquired, it would purchase an annuity in the funds, much higher than ever before was drawn from the lands; and the expence of managing that fund would be greatly less than that of landed property. The following statement will shew what the probable encrease of income would be, to the persons having now a right to these funds.

If land sells, on an average, as it does at present, at about thirty years purchase; mortmain-lands would sell at forty years purchase, at least, of the gross rent.

Lands yielding 100*l.* *per annum*, of gross rent, at forty years purchase, would bring 4000*l.*; the neat free rent of which is at present, on this supposition, 50*l.*: but call it 60*l.*

This sum, if employed to purchase three *per cents*, at the rate of 60*l.* *per cent*, would purchase an annuity of 200*l.* (At present, February 1798, the three per cents are at 49, consequently, the annuity would exceed 240*l.*)

From which deduct for management, and this would be a very large allowance, $1\frac{1}{2}$ *per cent*, there would remain 197*l.*, (above 236*l.*) which is more than three, (nearly four times the amount of the sum at present drawn.)

I am myself convinced that the above calculation will be found to be very near the truth; but should any one be inclined to think it erroneous in some degree, let him deduct what he shall think proper. It is certain, the balance, never can be turned to the opposite side of the account with the smallest pretensions to truth; so that, at all events, the income of those who have a right to these lands must be considerably augmented; and they must, of course, have an interest to promote, and not to retard the measure proposed.

With regard to other lands in mortmain, appropriated to charitable purposes, which are necessarily put under the management of persons who have no right to apply any part of these funds to their own use; the benefit that would result to the objects intended to be supported by these charities, would, by this means, be immense. Parliament has of late had this subject under consideration; but though they have discovered abuses to an astonishing extent, it does not appear that any radical measure for preventing the like abuses in future has been adopted. It is submitted, whether considerable benefits would not result from the ordering these lands to be sold, and the money to be applied as above; with this express injunction from parliament, that the agent

should issue no payments from this fund, for the use of the current year, until the accounts of the money for the former year, in which all the *items* should be *severally* stated, and the vouchers transmitted to a proper person to be appointed to act as auditor of these accounts, were passed by him; especially if it should, at the same time, be enacted, that all persons in the management of these funds at the time, and their heirs, should be made liable, conjunctly and severally, to make up, out of their own private funds, whatever deficiency could be instructed to have accrued from any mis-statement by them, or falsehood in these accounts; if it should be detected any time within forty years of the period when the faulty transaction took place. There seems to be, indeed, no way of curing this evil, but by thus separating the management of the mortmain property from the application of the money arising out of it, to the purposes prescribed by the donator.

One agent might be appointed for the management of the church funds, on whom the respective claimants should be empowered to draw for their respective shares, at stated periods; and another, if it were thought necessary, for the other mortified funds. These agents to be entitled to retain a specified *per centage* for their trouble;

and to find sureties to a proper extent for their intromissions.

With regard to entails, I do not find they are much complained of in England. But in Scotland they operate nearly in the same manner to the retardment of improvements, as the church-lands in England. The time is not, perhaps, as yet arrived, when a modification of these can be attempted. And as estates, under this kind of tenure, are usually of considerable extent, they come less in the way, as obstructions of other improvements, than the former. But should a time ever come, when very small estates shall be laid under this kind of restraint, I can have no doubt but a measure of the same sort as that recommended above, would be found expedient as to them. Indeed it would be, for very obvious reasons, a much more eligible plan to grant a power by law, to entail to a certain line of heirs the annual rent of this kind of property, or the value of so much corn specified, than that of land itself; as it would remove many very heavy obstructions to agriculture, and would provide with equal effect for the preservation of a name, and the continuation of a fixed income, to a certain line of heirs (*f*).

To forward such a beneficial change as this would occasion,—might not a law be passed authorising any owner of entailed property, to sell

that property, under the authority of the Court of Session, if in Scotland, or other competent court if in England, whenever the proprietor should apply, after having ascertained, under due forms, the present free rent of the estate, whether in money or in kind; the judges being authorised and required to allocate so much of the price, as should be sufficient to purchase an annuity in the funds of the same amount as the free rent of the estate fold; there to remain untransferable, except to the line of heirs prescribed by the entail; the remainder of the price to be at the disposal of the vender of the lands; or, at the will of the court, to be applied as a fund for younger children. Particular regulations would, in this case, be necessary to be adopted, for securing the interest to the true line of heirs, which it would be easy to devise: but of which it is unnecessary to say more in this place.

§ XI.

*Indefinite claims upon Land, considered as an
Obstruction to Agricultural Improvements*

To this head are referable tithes, poor's rates, and some other claims of less consequence.

Tithes.

It appears that the drawing of tithes in kind, is *universally* complained of as a grievance in England; as there is scarcely a single survey of a county, in which it is not mentioned as an evil that ought to be remedied. Nor, indeed, is it a wonder, that this should be complained of as a grievance: for the drawing of tithes in kind, when it is examined with attention, will be found to operate directly, in the strictest sense of the word, as a tax upon industry; and to be at the same time more vexatious in the mode of collecting, than perhaps any tax that has ever been adopted. And if it be also adverted, that the mode of collecting it is so expensive as to afford much less to him who receives, than it takes from him who pays, it will not be so much a wonder that it excites universal disgust, as that it has not long before this time been so modified, as to afford relief to the parties interested in it: for it is certainly not beyond the powers of man to devise some expedient, where both parties, are sufferers, to give *one* of the parties, at least, relief, if it cannot be extended to both.

There are four different descriptions of persons, who may be affected more or less by the drawing

of tithes in kind; viz. 1st, the farmer; 2^d, the proprieror; 3^d, the parson or the impropiator of the tithe; and, 4th, the public at large; each of which I shall beg leave separately to consider.

The farmer. He is more or less affected by it, according to the situation and circumstances of the land he occupies. If it be a corn farm, (and I beg that all the remarks here offered may be understood as applying to this description of land) and if the land be of a rich and fertile quality, so as to require no extraordinary expence in cultivating it, nor any purchase of manure from without; especially if he has no lease, or only a very short one; the drawing the tithes in kind can be considered as a matter, to him, of comparatively small moment; seeing he is precluded, by other circumstances, from extraordinary exertions of industry. The amount of the tithes, in this case, can be as nearly ascertained as is necessary to enable him to make a calculation sufficiently accurate for his purpose: and the tithe, as to him, can only be considered as a part of his rent; so that whatever be its amount, he will be able to pay a rent to the landlord, just that much less than he would have done, if that tithe had not been drawn: and he can carry on his opera-

tions nearly in the same manner he would have done, if no tithe had been drawn. It only proves disagreeable to him, on account of some vexatious interferences that may occur in regard to the drawing of the tithes, which he can sometimes convert to his own emolument.

But the case is very different to the farmer who occupies land of an inferior quality, which stands in need of extraneous manures, and expensive disbursements before it can be made to yield abundant crops. His efforts might, in this case, be compared to those of a labourer, who should make considerable exertions during the hours of relaxation throughout the day, in order that he might obtain a bit of something hot for supper ; but when he was just preparing to enjoy his hard earned morsel, he had it taken away from him by a neighbour who had stood by idle all day, and now came, by means of a legal authority he had obtained, as a reward for some exertions of his predecessors, when the state of society rendered such a mode of remuneration the easiest of any that could then be devised, to seize that which the poor man had so hardly gained by the sweat of his brow. Though the poor man is forced to give up his morsel in this case, it is impossible for him to yield it without reluctance : or ever after.

wards to view his neighbour with a favourable eye.—It provokes an invidious parallel to be drawn between the two parties, which estranges them the more from each other. The consequence is, that although, in this particular circumstance, the one gains just as much as the other loses; yet it tends very little, upon the whole, to the emolument of the receiver; because the loser says within himself, since I cannot enjoy my own morsel myself, I can at least prevent my neighbour from getting it; for nobody can compel me to earn it but if I please. So down he sits in indolence; and neither of them enjoy the blessing that might have resulted from industry.

That this is no fanciful case, but an exact representation of what must and actually does happen every day, in regard to tithes, will appear evident from the following statement of facts.—Before a farmer can make any expenditure upon his land, he must have a reasonable certainty of drawing it back; or, if he does not, his own ruin must be the consequence. If he is a spirited man, however, and finds that by the outlay of twenty shillings upon manures, or extra labour, or other means of improvement, he has a reasonable prospect of augmenting his crop to the amount of twenty-two shillings, he may venture to go on:

but with less than that he must be a loser. He accordingly lays out his money. His crop is augmented as far as he expected: but, when ready to be brought into the yard, the tithe-gatherer carries off one tenth of his produce; which is nearly to the value of two shillings; and the profits which he had such a good reason to expect, are taken entirely away: thus he must finally abandon all attempts at improvement on this plan.

Had the farmer been permitted to go on, he could have continued the practice without loss at least; and the public would have derived a benefit for ever, from such annual outlay, to the amount of *two and twenty shillings* of increased produce: and this twenty shillings of expenditure for purchased manures or labour, would have put in motion an immense mass of industry. This, again, by being annually returned in the same channel, and augmented, as the moderate profits he derived from this outlay enabled the farmer to extend his efforts wider, would have gone regularly forward, till it naturally must have at last become a source of a prodigious augmentation of the produce, and an infinite addition to the national prosperity. But all these things are entirely stopped, at the very moment it was beginning to be put in motion, *by this destructive*

regulation of police. Under this point of view, tithe-drawing in kind operates exactly like the grub which destroys the germ of the sprouting corn; so that instead of a plentiful crop of grain, which the land ought to have produced, it is allowed to remain a waste, covered with thistles and other destructive weeds.

The case of the farmer thus circumstanced, is even harder than that of the poor labourer above stated. If the labourer was not permitted to touch his well-earned meal, he was not at least deprived of any part of the property that had once been positively his own, and of which no one had a right to deprive him; but it may very often happen, that the farmer who should venture his money as above stated, would not only be deprived of the profit he ought to expect, but even of his capital itself, by one who could have had no right to touch that capital, but in consequence of these his public spirited exertions. Though the farmer had a reasonable prospect of drawing twenty two shillings instead of his twenty of expenditure, yet he can have no *certainty* of it. No insurer can here be found, as in mercantile concerns, to guard against risk. He must run that risk himself. Instead of twenty-two, he may reap only fifteen shillings. To this, as to

the will of Heaven, he must submit, in hopes that a more abundant return at another time will make up the loss. But even in this afflictive case, the tithe-man comes, and takes from his fifteen shillings one shilling and sixpence, so as to reduce his original twenty shillings to thirteen shillings and sixpence. Is it a wonder that he feels this deduction as a cruel hardship? And if the tythe be demanded with haughty imperiousness, instead of sympathetic lenity, can we be surprized if he feels sore, and deems it a burthen that is cruelly oppressive? And can it fail that such an impression will operate most powerfully in checking every future attempt at expenditure, with a view to augment the produce of his farm? No man, who thinks at all, can believe it possible these impressions will not be felt, and that very disagreeable consequences will result from these feelings.

Other cases might be stated abundantly illustrative of the pernicious tendency of tithes; but I wish not to enlarge on a subject that is so evident. I shall only beg leave briefly to observe, that experience clearly confirms the truth of these deductions. In England, not to mention commons and wastes, much very fine land is allowed to remain in grass in a very unproductive state, which, with a very moderate degree of industry, and outlay of

money upon it, might be made to yield abundant crops of corn : and the reason universally assigned for this disgraceful state of management (I call it disgraceful, because, were it altered, even the grass land might be easily made twice as productive as it is, by a judicious use of the plough,) is, that the tithe of corn-land is so very heavy, as deters the farmer from having recourse to the plough : whereas in Scotland, where a corn-tithe is never drawn in kind, immense tracts of country, which thirty years ago were covered with heath, and totally unproductive even of grass itself, are now converted into fertile fields that yield abundant crops of corn and grass ; and which, if the tithe-laws had there existed, must, in all probability, have continued unproductive till the end of time. This is a contrast that is very striking to every one who travels these countries ; and it brings forward a practical fact, which ought to outweigh a million of speculative arguments. It will not be alledged that this difference proceeds from the superior energy of the Scottish nation. This is obviously not the case ; for it is well known, that in mercantile and manufacturing enterprise, where no such checks on industry are experienced, the English clearly take the lead. In every other species of exer-

tion, but in this alone, their superiority is admitted. And even in the line of agriculture itself, it will not perhaps be disputed: for many of the men who have made a conspicuous figure in these enterprises in Scotland, are actually Englishmen. It can be ascribed to no other cause but the operation of the tithe-laws, and some of the other obstructions to agriculture taken notice of in this essay, which do not operate on Scotland. The operation of the tithe-laws, then, upon the *actual farmer*, is undeniably pernicious.

Proprietors. But if the tithe-laws are hurtful to the farmer, they are perhaps still more so to the proprietor. Whatever checks the industry of the farmer, must, in a direct manner, diminish the income of the landlord; and as the energy of a farmer, when once excited, is well known to augment in proportion to the advances he has made, whatever checks that energy in the bud, occasions in time a diminution of income to the proprietor, much greater than can easily be conceived.

It was remarked, in a former part of this essay, that the proportion of rent which can be afforded for arable land, encreases with the productiveness of that land in a much higher degree than in the *ratio of the quantum* of the crop; so that what-

ever tends to render land permanently more productive than before, if no deduction be made from it, tends, at the same time, to augment the income of the proprietor in a still higher degree than that of its produce.

But as it is obvious, that the tithe operates as a dead bar to the commencing improvements in agriculture upon a soil of no great degree of fertility, so as to prevent the beginning of that motion, from the acceleration of which alone the proprietor can hope to derive considerable increase of rent; in all cases, his rent is diminished in a much higher *ratio* than one tenth, as it might seem to do by those who take only a slight view of the matter.

Should the proprietor of *poor* lands, seeing the impossibility of the tenants improving them, attempt to render these lands more permanently fertile by the outlay of stock upon it, that he never expected to draw back; but would content himself with a reasonable return of interest of the capital in name of rent, he would not find the case much altered. He sets out, we shall suppose, with this principle, that if he can secure a permanent rent, equal to five *per cent.* of the money expended upon it, he will be very well satisfied with it. Let us say, then, as before

that twelve bushels was the neat expence of culture, &c. which, on an average of all sorts of corn, was valued at 4s. *per* bushel; and that he had expended 20l. *per* acre, the interest of which, at five *per cent.* is twenty shillings, or in other words, five bushels. But before he can draw this rent free of tithe, the average produce must be, at least, eighteen bushels, out of which must be taken one bushel and nine tenths; so that instead of five, his rent will be reduced to three *per cent.* nearly; while the tithe-owner will be entitled to draw nearly two *per cent.* for ever, on the capital the improver had thus expended. It is needless to add, that under such circumstances it is vain to look for a general spirit of agriculture, either among proprietors or tenants, to both of which descriptions of men, the operation of the tithe-laws are highly oppressive.

In one other respect does the tithe become singularly pernicious to proprietors of land. The importance of preserving the whole produce of the ground upon the farm where it was reared, for the purpose of making dung, seems to be very generally understood; as I find a clause to that effect is universally inserted in the leases in every county of England, wherever leases are granted at all. What punishment would the proprietors

of these lands deem adequate to the crime of felling off the whole produce of the farm every tenth year? Yet great as this crime would be, it would not be adequate, in point of damage, to them, to the right of drawing tithe in kind from their arable lands; because the farmer who *sold* the produce, would at least become possessed of money to replace, in some degree, by means of extraneous manures, the loss he had incurred by the abstraction of the home-dung. Those who are intitled to draw the tithe in kind, are, in fact, by this means, vested with a power of enriching their own private property, if they shall so incline, at the expence of every other proprietor around them. In this point of view, therefore, tithes are singularly pernicious to proprietors of land.

Tithe owners and impropiators of tithes.—Tithes were evidently intended solely for the benefit of the persons of this description; but it has been seen above, that in the state of society which prevails at present, they have a more direct tendency, in many cases, to prove hurtful to others, than beneficial to them. In a thinly peopled country, where lands are fertile and not fully occupied, and where every man cultivates his own corn, and finds no ready sale for it,

this would not be the case. In these circumstances, no expenditure could ever be made on agriculture, but merely for seed and labour ; and, as the fields would be abandoned by the plough, as soon as they became in a small degree unproductive, and other richer fields be broken up in their stead, the expence of cultivation would bear a small proportion to the returns ; and where corn could not be readily sold at all times, the payment of a part of the produce would perhaps be the easiest way that any kind of assessment could be raised upon the people. This was evidently the state of Europe, when tithes were first established ; but the situation of things is now changed, and from that change the evil complained of derives its origin.

Where tithes are to be drawn in kind, the expence of collecting, at different times, as the crops become fit to be carried to the yard, small parcels of corn from a number of individuals at a considerable distance from each other, and from the person who is to receive it, must be very considerable, and must make a defalcation in their amount.

The trouble likewise attending this kind of collecting, must be very great ; and to a clergyman of a retired disposition, addicted to literary

pursuits, and studious of quiet, it must prove one of the most unpleasing tasks that can be imposed upon him : so that, of all employments that could be devised, it is in every respect the most unbecoming a clerical character: more especially when it is considered that, from the causes above stated, every person concerned will feel himself disposed to pay it with reluctance, and will throw every obstruction in the way, that he thinks will tend to render it disagreeable and troublesome. To avoid this heavy train of evils, most of the sober-minded, well disposed, worthy men among the clergy, wish, at all events, to free themselves from it. If they attempt to draw the tithe themselves, unable to cope with those who are accustomed to transactions where cunning and chicanery are exercised to their utmost stretch, they are imposed upon at all hands, and receive but a very small proportion of what they have a legal title to draw. If they attempt to transfer their right to another, that person must be very well paid for executing an office which is attended with so much trouble, and so many disagreeable interferences with their neighbours. Few, indeed, will undertake the task, unless it be persons of a turbulent disposition, who are disposed to grasp at all advantages ; and who will

not perhaps be very scrupulous at imposing on the clergyman as readily as others. In this way, I have reason to believe, that a worthy clergyman of primitive simplicity of manners, does not, in many cases, realize much more than one half the sum he has a legal claim to exact. To *such* men, this mode of providing a living for them is perhaps among the worst that can be devised.

But if the person having a right to the tithes, be one of a turbulent disposition ; one who is eager to grasp at all advantages ; one who is regardless of the circumstances of others ; one who is little scrupulous about the means he adopts for obtaining an ascendancy over his neighbours ; and who, laying aside the decorum becoming a clerical character, engages in a perpetual bustle and wrangling, determined to exact with the utmost rigour every *item* that the law authorises him to levy ; the living, that would be a poor one in the hands of the person of the former description, will be, to him, abundant ; and he will live in affluence ; while the family of the other is condemned to comparative poverty. In acting thus, however, he loses all influence in his clerical capacity. His practice belies the doctrines he is obliged to preach. He becomes detested and despised. In the performance of religious duties

he is deserted: the morals of his parishioners are corrupted, and the finest bands of society are dissolved. He becomes, in short, a disgrace to the venerable body to which he belongs: and the whole order, because of his improprieties of conduct, falls into general disrespect.

Such are the natural effects of the operation of this law on the body of clerical tithe owners; and here too it must be considered as equally, perhaps more, pernicious on the public than we have felt it on former occasions. Every law ought to be "a terror to evil doers, and a protection to those that do well." But this law operates in a manner directly the reverse; for it protects only the evil doers, but leaves those that do well to be pillaged at all hands (g). Miserable, then, must be the delusion of those who wish blindly to support a system of police, so directly opposite to the principles of common sense, so contrary to the spirit of the religion we profess, and so destructive of sound morals. It is surely a praise-worthy attempt, to endeavour so to modify it, as to protect the innocent, at least, if not to punish the guilty.

With regard to lay impropriators, the complaints against them, when compared with the

clergy, are loud from every quarter : nor do I recollect a single instance to the contrary in any of the agricultural surveys. From hence I think it fair to infer, that the clergy in general do not, at the present moment, on an average, draw from the tenants, either by themselves or substitutes, nearly the full amount of what they have a title to exact ; and that, of course, after the allowance to substitutes, and the expence of collecting, are deducted from the payments made by the occupiers of land, the sums that are actually paid into the hands of the clergy will be greatly short of what ought to be paid by the farmers.

It has been said by a very ingenious gentleman, (I believe Mr. Howlet,) that the clergy are in general very liberal in regard to the tithes : and that if they were rigidly to exact what they have a title to claim they would ruin half the farmers in England. I am inclined to believe that the statement is just ; and it brings to light a most alarming truth : viz. that the farmers in England are in a state of the most humiliating dependence, and are obliged, for the sake of procuring even subsistence for themselves and families, to court favour of the tithe owners, by every compliance they can exact. The more abatement they have been accustomed to receive, the greater must be

their dependence, and the more ruinous to the proprietor; because whenever the tithe-owner chooses to be rigid, the farmer must be ruined, and the landlord must suffer by his calamity. Better were it for all the parties, that the tenant were obliged to pay the full tithe on all occasions, so that it were but fixed in such a way as not to admit of being augmented in proportion to the degree of his industry.

The Public. With regard to the effect of drawing tithes in kind upon the *public at large*, enough has been said, in the course of the foregoing remarks, to shew that these are pernicious in the extreme: inasmuch as they put almost an unfurmountable bar to agricultural improvements of every kind;—stop, to an astonishing amount, the circulation of money that would be expended in purchasing extraneous manures, and in prosecuting other means of improvement;—diminish the quantity of corn that would be reared, to an inconceivable amount;—and put a check, in the bud, upon those exertions of industry, which would spring up from innumerable sources that would be opened, were this great bar to improvements removed, or at least so altered by judicious modifications, as to secure the interest of the parties for whose behoof the

institution was originally made, without being productive of the evil consequences that in its present state result from it.

With this view, I humbly beg leave to propose as a proper, if not a necessary measure, in the present state of society, that the tithes in England and Wales should be converted, so as to make a payment in money be universally received in lieu of the payments in kind that are exigible at present; but under such modifications as to prevent the possibility of those who are entitled to draw the tithes from suffering, by that depreciation in the value of money, which we have seen for a long time past has been going on in a regular progression; and may be expected to continue; or may, perhaps, as at this time in France, be sunk almost to nothing, by some political shock that cannot at present be foreseen.

With these views, might not a law be obtained, authorising the valuation of tithes, in every case where either of the parties interested in it should so incline? This might be done by a summons raised against all the parties concerned, either before the sheriff of the county where the property lay, or before any other judge that should be thought more proper for executing this office; who, after hearing parties, should

proceed to make a legal inquest to obtain a clear proof of what had been the amount of the tithes actually paid and drawn, for five, ten, or twenty years past, as should be judged best, out of the several lands in question; specifying distinctly the quantity of each denomination of grain, or other titheable produce. But as it may easily be foreseen, that it would be a matter of great difficulty, in many cases, to get at these facts with precision, might it not be put in the power of the judge, if the parties could not agree as to that particular, to appoint two or more persons of good character, in the neighbourhood, to gather up the tithes in kind themselves, fairly and honestly, for five years next to come, without favour to any person; the amount to be delivered to the person having a right to receive them, after the quantities had been respectively ascertained, so as to admit of the collectors making up an account of the whole, upon oath, to be delivered to the judge; who, from that account so made up, should cause an average to be struck of the quantities of each particular article; which average quantities, after deducting a just proportion for the expence of collecting, and taxes affecting the tithe, should be declared by him to be the

legal tithe exigible from the lands in question in all time to come.

But as there is room to suspect, that the money prices of corn, wool, &c. of different denominations, may rise to be much higher in some future period than it is at present ; instead of now ascertaining the price of these articles, let it be declared, that the quantities of grain and other articles resulting from the averages respectively, are payable out of the respective lands, leaving the average prices of such grain, &c. to be ascertained each year, as shall be specified below ; declaring, that the money which shall arise from the average prices thus ascertained, should be in lieu of the whole tithe that could be exacted each year : the time of payment to be specified.

And to prevent all disputes as to the average prices of these articles, in time to come, let the sheriff of each county be authorised and required to make an inquest at Candlemas or Lady-day each year, of what had been the actual ready money selling price of corn of the preceding year's crop, from the time the corns were reaped, till the present time, and of wool, and all other titheable articles for the preceding year, by examining witnesses before a jury to be appointed for that purpose ; which prices, after being thus as-

certained, should be published, and declared to be those by which the quantity of tithe-corn of each particular description, and other titheable articles, contained in any degree of valuation, should be payable for the crop of the preceding year. Thus would the tithe-owner be entitled to receive payment of his tithe, without any extraordinary expence or trouble, or unjust deduction or dispute whatever: the farmer would be allowed to carry on his operations uncramped by those galling restraints which the tithe-laws at present perpetually throw in his way. The proprietor would be at liberty to apply such part of his capital as he might incline, towards promoting agricultural improvements, with a reasonable prospect of being benefited by his exertions; and the public would become possessed of a quantity of surplus produce of land, which it can have no prospect of ever otherwise enjoying, that would be the means of diffusing a perpetual plenty through every corner of the land.

The conversion of the tithe has been simplified in the law enacted for that purpose in Scotland; which, though easier in the execution, and perhaps equally just with that above stated, I have not ventured to propose; because the principle upon which it is founded is not quite so

obvious as the above. By that law, it is enacted simply, that the rents of the land actually payable by tenants at the time the valuation is made, or the rent that ought to be paid by lands not tenanted, as ascertained by a jury of honest men competent to judge in these cases, being clearly ascertained, one fifth part of that rent, whether it be payable in money or in kind, shall be declared to be the tithe payable for ever out of the lands in question.

Many considerations induce me to believe, that were this rule adopted in England, the result would ultimately be not very different, in most cases, from that mentioned in the text; and therefore, as being more simple, and more easily executed, I should, myself, be inclined to prefer: but as I suspect the general opinion would not coincide with mine in this respect, I thought it better to give way to that; and therefore only mention it in this casual manner.

Among all the persons interested in this particular object, no one of them, it would seem to me, would receive such a benefit from this change, as those established clergy having a right to tithes, who are of a quiet inoffensive disposition, and who are ambitious of discharging the sacred functions of their office with decorum of

character and purity of heart. I have no doubt, but, in most cases, these men would thus receive an immediate addition to their income, of from thirty to forty, in many cases more than *fifty, per cent*; and to that would be superadded the satisfaction of living in peace and quiet with all around them, without being under the necessity of guarding against the chicanery of those who had set themselves to prey upon them. To such men, then, the institution proposed cannot fail, I should think, to prove highly acceptable; as it provides for them an effectual shield to guard them against all injustice, which they never could otherwise have obtained.

To the boisterous disturbers of the public tranquillity among the clerical order, and the cunning and avaricious lay-impropriators of tithes, the regulation would prove less acceptable, because it would curb their powers, which they take pleasure in exercising; on which account, although it would doubtless augment their income, yet that augmentation would be in a less proportion than to the others; and, therefore, it is not impossible that some of this description of persons might be rather inclined to oppose this salutary change. But are the wishes of *such* men to have influence with the public? As soon might the wish of the

swindler, to oppose the laws by which he was to be restrained in his wicked courses, be attended to by the legislators of this land.

The farmer is the only description of persons which could in any respect suffer by the change. At present, it is not doubted that many farmers fall upon shifts for getting a composition for their tithes considerably below their real amount. This they could not hope to enjoy in future; for the agents appointed to draw the tithe in kind for the five years, would no doubt execute their duty with a strict impartiality, so as to prevent any thing of this sort from taking place during that period: to him, therefore, the change might be immediately for the worse. But our view here is not to protect any one in a system of fraud or imposition of any sort, but to do strict justice between man and man; so that he could have no real cause of complaint in this case: and for the trifling loss he might thus, in some cases, sustain, he would derive a power of benefiting himself to a much greater extent, by the more dignified exertions of a manly industry.

The farmer may, in this instance, be compared to the smuggling manufacturer, who sometimes gains a little money by fraudulent means, but is seldom seen to become wealthy. His risks are so

great, and the attention he is obliged to bestow to guard against these, is such as to call off his attention from the mode of conducting his proper business in the best manner; so that his goods are often of a bad quality, which forces him to adopt unbecoming modes of putting them off; and this, at the same time that it gives his mind a bias to little arts of chicanery, renders him slovenly in business, that cramps every exertion; so that he continues in general both poor and abject; which would not have been the case, had he continued to exert himself fairly in the candid and honest line of procedure. Nothing tends so much to lower that honest blunt dignity of mind, which ought to form the principle feature in the character of a farmer, as that of being in the habit of having recourse to little arts of deception and fraud, which the practice of drawing tithe *in kind*, so necessarily cherishes. If a man is in the habit of thinking lightly of one kind of fraud, he will gradually come to be less scrupulous than he otherwise would have been in regard to others: but where is the farmer who thinks it a crime to defraud the tithe owner? Do they not in general glory in it as a meritorious proof of their ingenuity. Thus are the morals of country men perverted, and their minds debased by this injudi-

cious regulation of police. Can any thing be more becoming the clerical character than to remove from society this stumbling block which has such a powerful tendency to pervert the mind of unsuspecting individuals? On this account I should suppose that the whole of the clergy who have the conscientious discharge of their duty at heart, would be, to a man, strenuous in their exertions to forward that commutation I have recommended. From what has been already said, it is clear that none of them could possibly be hurt by it, and that most of them would be greatly benefited by the measure. They themselves, as well as their successors, would be benefited yet in another way that has not been hitherto pointed at. To avoid the payment of a corn-tithe, which is found to be the heaviest of all, a practice has been begun, and prevails more and more every day, of converting tillage land into grass. Wherever this takes place, the tithe owner's income must suffer a considerable diminution; nor is it in the power of the tithe owner to prevent this, as to him, pernicious alteration, by any other plan, except that of the conversion above recommended. Let them, therefore, be strenuous in promoting this measure and they will thus, at the same time, benefit themselves and free their body from the

general imputation which has been thrown upon it in consequence of the tithe laws. In the present state of the public mind in Britain, nothing could have such a salutary tendency as a conduct of this sort in the clergy.

Upon the whole, I know perhaps no regulation of police that would have a more direct tendency to promote public tranquillity in the State,—to excite a spirit of industry among the great bulk of the people,—or to augment the prosperity of the kingdom, than the abolition of tithes: so that one would naturally suppose, that, after the public shall have had time to consider of it, scarcely could any serious opposition be expected to be made to a measure of such an obvious beneficial tendency.

I have above endeavoured to obviate all such objections as might be expected to originate with men who consider the subject with a candid desire to promote the measure, if it can be shown to have no tendency to prove hurtful to honest individuals having interest in it. But I am aware of a train of considerations that will influence a variety of classes of men to oppose this proposed improvement; though these, as originating from secret and sinister motives, will not be avowed: but, that they will operate as an

irresistible bar I have no doubt, against the adoption of such a proposal, should it ever be seriously brought forward in parliament.

I have already hinted at the reluctance with which many farmers would give ear to such a proposal; because they have been in a train of profiting by artifices and chicanery, which they would think they could no longer exercise, were this passed into a law. To these must be added, for the same reason, the farmers of tithes in general through the kingdom. The weight of this kind of influence will be greater than, at first sight, will seem to be obvious: for these men, by giving occasionally hints and innuendoes to their landlords, of the inutility or ineligibility of the measure, will slacken their zeal in the cause, so as to render other objections of great weight.

But the curse of this country is, that a view to parliamentary interest operates through a thousand unobserved channels, to retard almost every useful improvement, though it dares not be openly avowed. It is this overpowering influence that will, I fear, swallow up every other consideration in the present case, and render all arguments, however seemingly irresistible, of no avail. In vain do we now (1796) hear innumerable cries of the scanty produce of this island, and the amazing

exertions that ought to be made to remove it, this influence, I have no doubt, will make the very obvious means of effecting it, above developed, be entirely disregarded. Tithe-owners of every description find, that the influence this give them over a very numerous body of voters, is an engine they will not readily wish to part with. And however much a few clergymen, of pure hearts, and primitive simplicity of manners, may wish for the change I have proposed, yet there is not a doubt but the great dignified clergy, and their numerous connections, will all behold such a proposal with jealousy, and probably reject it with contempt. It is easy to perceive that those descriptions of men, also, who exercise political sway over them, will eye it with the same jealousy. Under these circumstances, what room have we to hope that the voice of *reason* will prevail? I expect no such thing. But let it be understood, that this is the *real* cause which opposes the measure, whatever shall be the *ostensible* reasons brought forward to oppose it, if ever it should be brought under the consideration of the legislature; which, from the above considerations, I have not the most distant hope of seeing done. Futile attempts may be adopted, apparently to encourage agriculture; but, in reality

to give a little popular fame to individuals, while the only effectual incitements to it that ever could be given, will thus be entirely set aside.

Poor's Rates.

A more striking example cannot be found of the limited extent of the human faculties, than what regards the law imposing a poor's rate in England. There is not perhaps to be found, in the annals of legislation, another instance in which so many circumstances concurred to give perfection to any institution, as this. The idea of it was conceived at that period of the British history in which was discovered as great a strength in the reasoning faculties of the legislators of this country as at any other. The object they had in view was worthy of a great and a virtuous people: they aimed at securing for the feeble and helpless part of society, a permanent fund of support, which might render their lives as comfortable to them as human aid can afford. The subject was considered by the legislators with the most anxious attention. Their deliberations were uninfluenced by party zeal, and were calm, moderate and considerate. They placed the subject in every point of view that could occur to

them; and guarded, with a cautious foresight, against every evil that they expected would originate from it. At last they were satisfied they had devised a law, which would compel all those unworthy members of society, who were not endowed with the tender feelings of humanity, to contribute in the same *ratio*, in proportion to their means, towards the support of the poor, as others of more generous principles; so that, by making the load press equally on the whole, it could never become oppressive to any part: they considered it as a law, which, while it would enable the industrious person, who was rendered feeble by age, to repose in peace under the assured certainty of a competent support, would afford no inducement for the licentious and debauched orders of men to hope for a share in it: they considered it as a law, in short, which was to encourage a spirit of industry, and to promote the well-being of society, in so great a variety of ways as to distinguish England above all others as the wisest of nations, and to render her people the most prosperous and happy of any in the universe. Any one who looks into the debates of parliament, and the political writings of the times, will easily be satisfied that the above is a fair representation of the judgment that was

formed of the operation of that law about the 43d year of Elizabeth, when it was first enacted. Experience however has proved that all these high expectations were entirely unfounded. It is now discovered that the mode of levying this tax is so far from reaching all denominations of persons, in exact proportion to their means, that it is in its operation more unequal than perhaps any other tax of the same magnitude that can be named: it tends greatly to repress industry, in an immense variety of ways: it promotes dissipation, extravagance and immorality among the lower classes of the people, to an astonishing degree; and has given rise to a system of speculation, among some of better rank, that has degenerated into a kind of legal robbery, against the effects of which no adequate means of defence have yet been discovered. This kind of legal pillage has at length arisen to such an amount, as to have attracted the attention of parliament; in consequence of whose researches it has been discovered that the evil has been of late encreasing with such rapid strides, as to threaten, in a short time, to prove the ruin of the country, unless some adequate means shall be discovered for checking its progress. This has at length excited a very general alarm; and gentlemen of property, in many districts, have set themselves seriously to

try to moderate this evil. In some instances, they have so far succeeded as to moderate it for the present. But whether these measures will prove to be a permanent cure, or only temporary palliatives time will discover.

It would lead me into too wide a field to enter minutely into the consideration of this subject; which is the less necessary, as it has been so well done of late by several very able hands. My object here is only to show in what respects it affects the farmer, and those who are connected with landed property and its improvement.

The first point that here demands attention, is the vast proportion of this tax which falls to be borne by land-holders: for I believe it will be found, that nearly three-fourths of the whole amount of the tax is paid by the landed interest alone.

To give a clear idea of the unequal manner in which this tax affects property of different kinds, it will be necessary to arrange all the property into classes, which, for our present purposes, may be these three; viz. 1st, landed property, including farmers; 2^d, mercantile and manufacturing property, which may here be considered as one; and 3^d, moneyed property.

From the mode of levying the tax, which is by a certain *per centage* on rents, it is clear that

the value of every shilling-worth of property belonging to a landed gentleman, is rated to the utmost extent of the tax; so that if it be at the rate of six shillings in the pound, a landed proprietor who draws an income of one thousand pounds, (out of which is also to be taken, in many cases, the land tax,) pays, of poor rates, to the amount of three hundred pounds.

Property employed in merchandise or manufactures is rated to the poor in a much lighter proportion: for I suppose it is no uncommon thing for a man, in either of these branches of business, who draws at the rate of one thousand pounds a-year of clear income, not to pay above one hundred pounds of rent. Supposing he pays the whole of the rates on these premiums, he would only be rated at thirty pounds; precisely one-tenth the rate at which the land-owner pays of that fund! Though this be little, still he pays something. But as to the money-lender, let him have an hundred thousand pounds, or ten hundred thousand in the stocks, or at interest upon mortgage, he pays not one single farthing to the poors' rates. This is a striking inequality, which loudly calls for redress. But this is not the worst case that may occur.

The man who is entitled to receive one thousand pounds a-year of land rent, may have con-

tracted debts by mortgage, for the payment of younger brothers' or sisters' portions; or, perhaps, by his own extravagance, during the giddy years of youth, to the amount of twelve thousand pounds, the interest of which will amount to 600l.; so that he has only 300l. of free rents; yet, in consequence of the money-lender being totally exempted of poors' rate, this poor man still pays out of his estate 300l. *per annum* to the poor! Thus it appears, that instead of being a burthen, which, by being equally divided among all classes of people according to their means, presses lightly upon the whole, as we must suppose the original framers of the bill intended it should be; and as many persons, who observe not things with accuracy, believe it does, and vaunt of it for this supposed equality, it is the most unequal tax, I believe, that can be named in this island: for while it deprives one class of men sometimes of half the means of their subsistence, it allows other classes of men to wallow in wealth, without paying one single shilling to the poor.

It may appear to us surprising, that a law, which has such an obviously partial influence, should have been passed without adverting to this circumstance; but we have not so much

reason to wonder that these consequences should escape the legislators, as to be surpris'd that a set of sensible men should believe it possible to devise a permanent system of settled coercion, to be limited by rules fixed by them,—or should not have adverted, that as there is a perpetual change in the circumstances of all sublunary things, those very measures, which are salutary at the present moment, may, in the course of time, become highly pernicious. At the time this law was enacted, neither mercantile nor manufacturing property bore any proportion worth naming to that of landed property; and as to property in the funds, it did not then exist; and that which is now called moneyed-interest, was but of small account, compared to what it now is: so that these funds might be then disregarded, as of too trivial importance to be worth notice: but things, in this respect, have since been greatly changed. Nor is this the single case in which particular classes of men have come to be affected in a very severe degree by the poor-laws, in consequence of a change of circumstances in this country.

It was not then adverted to, that a spirit for manufacture might arise, which would render it proper to erect machinery in many places where nothing of that kind then existed, and to plant

numerous bodies of men, for carrying on these manufactures, in places which were before uninhabited: nor were the consequences that the poor laws would have in this case observed. It is now, however, well understood, that in consequence of the difficulty of obtaining a settlement in any parish, from a just apprehension that these new settlers or their descendants may come upon the parish at some future period, the operations of manufacturers are, in many cases, very much hampered. It is but a few years since a very spirited manufacturer in the iron branch, found himself so much incommoded by this circumstance, that he thought it necessary to apply to parliament for redress. In his petition he set forth that he had been at a great expence in erecting works of various sorts on the premises that belonged to him, for carrying on the different branches of his business: that he had also engaged from a great many places in this island and in foreign parts, many hundreds of persons well skilled in their business, and brought them there at a vast expence; yet, after all, he found his labour frustrated by the proprietors in the parish refusing to allow them to settle in it. And although he had made offer to come under an obligation to free the parish from all the persons he had so brought from other places ever be-

coming a burthen upon the parish, yet that this offer was rejected; the parishioners positively refused to admit these persons to a settlement; so that he found himself in danger of being subjected to vast loss from that cause: and praying that parliament would grant him such relief as to their wisdom should seem meet.

To this it was answered, on the part of the land-holders, that as, by the poor law, as it at present stands, the whole burthen of supporting the poor in every parish, rests on fixed property affording an annual rent, which is thus mortgaged for the support of the poor, to any amount that might at any future period be deemed necessary for them, were it even at the rate of twenty shillings in the pound, (the parish of in Essex, I am assured upon the best authority, is at present assessed at twenty three shillings in the pound of rent !!!) it became their duty to prevent, in time, all such measures that might be adopted by others for their own immediate emolument, which should run a risk of deteriorating the property of land-holders to such an amount: that the offer made by the proprietor was by no means adequate for their safety; because, although he should support the immediate emigrants themselves, all the descendants of these emigrants would have a claim for their support,

upon the property of the parishioners, even to the hundredth generation and more: that though it should be granted that the petitioner was, at present, in such circumstances as to enable him to support the whole of the persons in question out of his own funds, yet as the property of every manufacturer was of a fluctuating nature, so that what seemed to day as stable as the mountains, might to morrow be dissipated entirely, his offer afforded them no adequate security: that were he even to purchase lands for that purpose, these could not be so secured as not to be attachable, in many cases that could be stated, so as to be carried off, and leave the objects of the present contest upon the parish; and even if lands to a certain extent could be so secured, who could pretend, at this moment, to ascertain what might be the amount of the sum that would be wanted, at some future period, for their support? On all these accounts, they contended, that no person ought to have a right so to affect their property without their consent; and parliament found it was not proper for them to interfere in this case. Thus it is clearly established, that these poor laws occasion such a clashing of interest between the manufacturing and the landed interest, as to prove highly injurious to both. And these mutual in-

terests must continue to prove a most powerful bar to the prosperity of the nation, so long as they shall be permitted to exist.

But though it be easy to state these evils which are already felt, (and many others might be added,) it is by no means so easy a matter to say how they ought to be redressed. Indeed, it would appear to be not a little presumptuous for a private individual to take upon him to prescribe a remedy for that which has baffled the wisdom of parliament itself: I shall not therefore attempt it. All that I shall add, on this subject, is barely to observe, that in many districts the land-owners have already taken this subject under their consideration; and, by their joint efforts, applying remedies to suit the locality of the case, they have succeeded in moderating the evil. But men of landed property have so many other avocations, and are so frequently called from home, that it cannot be expected that they will be able to fix their attention so long on this subject, as to produce any thing like a permanent reform. But were they to grant long leases to able and wealthy tenants, they would thus create a phalanx of watchful forces, who would be able to oppose, with a firm and steady effect, every measure that tended to encrease, without

a just cause, the amount of the poor rates. For being, from the nature of their employment, always upon the spot ; and being immediately and chiefly interested in every augmentation or diminution of the poor's rates that should take place during the currency of their leases, they would watch over every circumstance that had an effect that way, with a degree of attention that no other person could give ; and would scrutinize every claim, and examine every particular, with such a minute degree of attention, as would prevent, even before they took place, every beginning enormity. This attention being foreseen, would even prevent attempts at many improprieties of conduct in parish officers, which are seldom now attended to till long after they are past ; at which period, an attempt to correct abuses is much more likely to produce additional abuses, than to remedy those that are already established.

The above is one consideration which ought to induce gentlemen of landed property to be desirous of granting long leases on all their lands. Under short leases, the poor's rate comes, at every renewal, to be considered by the tenant as part of his rent ; so that he deducts precisely as much from the rent he would willingly give to his landlord, as the rate amounts to. If the land

can afford twenty shillings *per* acre rent, and no more, it is the same thing to the tenant whether he pays the whole of that twenty shillings to the landlord, or ten shillings to him, and ten shillings to the collectors of the rate ; and he acts accordingly at each renewal of his short lease. The whole poor's rate in this case, falls to be borne entirely by the landlord. But as the tenant under a *long lease*, must take the whole burthen of the poor's rate upon himself, without having it in his power to throw any part of it upon his landlord till the lease expires, it becomes his interest strongly to prevent any undue rise of the rate.

The measure above recommended, would mitigate the evil in *country* parishes ; and as to *towns*, they are not so properly within the object of my present enquiry, as to claim a separate consideration. But the land-owners of the *country* parts of town-parishes, are in a singularly unfortunate situation ; for they must at all times be loaded with a heavy poor rate, which they cannot mitigate ; because, in all questions respecting this subject, they must be out-voted by a number of persons who can be but little affected by the poor's rates, whatever they may be. At all events, a law should be enacted, requiring, under the severest penalties, that the account of the

distribution of the poor's funds in every parish should be printed, and a copy of these accounts be delivered to each house-holder in the parish. In these accounts should be stated every *item* by itself, without being in any case confounded with others. And also it should be enacted, that a committee of three respectable persons in the parish, who have had no concern with the distribution of the poor funds for that year, should be chosen, by a majority of votes of the heads of families at large in the parish, for the purpose of examining these accounts ; to whom should be consigned all the vouchers, and who should be empowered to examine persons upon oath respecting any particular concerning these accounts. They should be required either to pass the accounts, or to give reasons for refusing to do so, within three weeks at farthest, from the day of their nomination. And let it be at the same time enacted, that in case of any objection being made to the accounts by the auditors aforesaid, the persons who had been in office while the errors complained of took place, shall be, *ipso facto*, prevented from having any share in touching the parish money, until the matter be settled by a legal decision ; which should be immediately commenced at the expence of the parish, unless they were exonerat-

ed from it by a majority of votes of the heads of families in the parish, at a meeting to be held for that purpose. And if any concealment, wilful error, or false statement in the accounts, should be discovered, within twenty years after the event happened, it should be competent for the parish to bring a summary action at the quarter sessions against the parties concerned; who should all be liable, conjunctly and severally, to make up, from their own private funds, the damage sustained; together with such a fine, not exceeding the sum of as the judge should see proper to award. Were such a law as this enacted, and were it competent to bring a summary action, in these cases, before judges in the country, and at a small expence, many good consequences would result from it.

The measures here recommended, might, indeed, tend to mitigate the evil; but before a radical cure could be effected, many other circumstances ought to be adverted to, and cautiously weighed, which the limits to which I must here restrict myself, prevent me from enumerating. It is a subject of *vast* importance, and requires the most serious consideration of every person in the kingdom; because, unless something effectual be soon done in this respect, there can

be no doubt, that before long, some dreadful revolution must take place in this island respecting property. It affords but a melancholy prospect to those who have viewed the subject in this light, to observe the futile nature of those measures, which have of late been brought forward to public notice on this very important subject.

§ XII.

Want of easy means of Communication, considered as a Retardment to the Progress of Agriculture.

WHENEVER the subject of roads and canals, comes to be discussed, this subject will necessarily be pretty fully considered, and the importance of it will then appear. Little more is necessary, than barely to bring it under view in this place, by referring to what may be afterwards said, that it may not be allowed to escape notice. I shall only farther add, that the importance of this subject is such that it cannot be too often brought under review.

§ XIII.

Want of Markets hurtful to Agriculture.

THE advantages of local situation, in respect to the conveniency of markets, is in general known; but it is by no means sufficiently understood; and there are innumerable cases in which industry is greatly retarded in this case, which are scarcely ever adverted to, although, by a little attention and care, the evil might be remedied. To lead the attention into a train of investigating this subject, I shall beg leave to offer a few slight hints with that intention.

To acquire discriminative ideas on this subject, it will be necessary to consider ground, *1st*, as being applied to tillage, and *2^d*, to pasturage.

In a corn farm, access to market with its produce must be obtained, either, *1st*, by means of roads; or, *2^d*, canals; or, *3^d*, by sea.

Where all the produce of a farm is to be carried to market by means of roads only, the expence of carriage becomes so great, when at a moderate distance from market, as to reduce the

farmer's profit to such a degree, as to put it out of his power to cultivate corn to any considerable extent, unless where the rent is very moderate in proportion to the amount of its produce. Corn can, in these cases, be, in prudence, only viewed as cultivable, merely as a preparation for grass; but as farmers are frequently inaccurate calculators, it often happens that, in this kind of mixed farm, where the practice of the district has been in favour of tillage in old times, land is, on many occasions, in these circumstances, kept much longer under the plough than it will pay. But as men are now a little more accurate in matters of this sort than formerly, they begin to diminish the proportion of their corn lands considerably. And this is one, among other reasons, that have concurred to render the quantity of corn raised in this island so much short of what it used to be in some former periods.

But wherever canals have been made, the carriage of corn to market, and of manures back in return, becomes so much more easy than on roads, that it may be said to bring the markets proportionally nearer to distant places, so as to enable the occupiers of such distant corn grounds to rear much corn with advantage, where it must before have occasioned loss; so that were the

tithe taken off, the augmentation of national produce in corn would, from this cause, be greatly augmented. And if ever the time shall come, when small agricultural canals shall become universal; and the modes of facilitating the intercourse on these canals, (that will fall to be enumerated under that head, whenever it shall come to be discussed) shall be universally adopted, the produce of this country in grain may be augmented to almost any assignable degree.

With regard to the transporting of agricultural produce by sea, it is liable to so many variations from local circumstances, that no adequate judgment can be formed of it, unless all these circumstances shall be taken into consideration: for it is easy to find two places, which are equally distant from a good market, that is alike accessible by sea, and subject to similar hazards; in the one of which places, the market for corn is nearly as good as if the consumers were at the door; and in the other, it is little better than if no such market had an existence. For example:

Lynn, in Norfolk, is nearly at an equal distance from London as Cardigan in South Wales is from Bristol or Liverpool; both of which markets are equally accessible by sea, and with as little

risk as the navigation from Lynn to London. Yet it so happens, that at Lynn, a farmer can at all times dispose of his corn, in whatever quantities he may choose, let it be one quarter, or one thousand quarters, and carry home the price in his pocket, if he pleases, with nearly the same certainty as he could draw money from a banker on whom he had a credit. But at Cardigan, no such thing can be found. He must wait times and seasons, and watch opportunities with care; and, after all, must often take an inadequate price, or submit to such ruinous deductions, as to render it absurd in the farmer to think to rear corn in quantities, or to give a tolerable rent for land to be applied for that purpose, on account of the precariousness of the market.

A very little attention to the circumstances of the two countries, will be sufficient to explain the cause of this diversity. Norfolk has been long a corn county, and merchants have, by degrees, found it for their interest to establish themselves at Lynn: to rear ware-houses there, establish correspondences in different places; and, in short, are in a condition to receive and to pay for any quantity of grain that may be offered to them: and they know how to dispose of it again to advantage in the ordinary course of their bu-

finess. Ships are sailing from thence every day during the winter season, loaded with corn, for London and many other ports; and it never needs to lie upon their hands almost an hour longer than they incline.

But at Cardigan the case is very different. Little more corn has been in use to be raised there than serves the internal consumption; so that a corn merchant could not find sufficient employment to establish himself there, or to erect the conveniencies necessary for his business. No one can buy there but when a chance ship shall come in the way; and then he can purchase only grain of a certain description, and in a limited quantity. The merchant is only to be found at particular times; and then he affords not a general, but merely a special demand for a particular sort. The price too will be limited and low: for where there is no general competition of buyers, an adequate price can never be expected. It is, from these, and similar causes, that the distance between London and Lynn, for the corn farmer's purpose may be said to be shortened almost to nothing; while between Bristol and Cardigan it may, for his use, be said to be little short of infinite. Thus it very often happens, that two things, which are alike physically possible,

are exceedingly diversified in their actual practicability.

In the present case, the two places in question may be compared to two places inland, equally distant from a good market, and equally susceptible of an internal communication with it by means of a canal ; but to one of which only a canal has been already made. Though they were alike susceptible of this improvement, one of them only has obtained it. Before the other can obtain the same advantages, some persons, who are interested in the business, and capable of completing the undertaking, must make the canal : for then, and only then, can the farmers and others who are to use it, but who have neither the knowledge nor the means to make it, be benefited by it. It belongs to the proprietors, in short, to create a market in all such places if they hope ever to derive an adequate rent for their land : and so long as they shall leave this object unattained, they must content themselves with a very small proportion of that rent they might otherwise easily obtain.

From what has been just said, it will appear, that the possibility of bringing distant corn farms within reach of a market, must depend upon local situation. It must either be within a reason-

able distance of a sea-port; or an inland canal must be practicable near it. In every distant situation differently circumstanced, it is impossible that corn can ever be reared with advantage for a distant market. The principal produce of all such farms must necessarily be grass, which must be consumed by live stock, that can be carried to market along roads that would be altogether impracticable by carriages loaded with corn.

It is by no means necessary for us here to enter into a consideration of the different kinds of live stock proper for particular situations; but it may be necessary to observe here, also, as in the former case, that all places which are *physically* alike, are not *practically* alike benefited by the market. In one county, for example, proper and well frequented markets or fairs for sales of live stock of all sorts, have been long established; so that animals of every denomination may be there disposed of at an adequate price, for ready money, at almost any season of the year, without difficulty; whereas, in the other, it is only beasts of a certain description that can be there sold, at particular times, and to a few individual persons, *upon credit*; who have it in their power not only to keep down the prices, but also to be-

come bankrupts, when they please, and defraud the poor sellers of stock to a very great degree. Wherever this practice prevails, it is obvious that the tenant cannot afford to give half the rent for ground of the same quality that he could have done in the other district, where the markets are good. There are many of the distant hilly parts of Britain, whose prosperity is much repressed by want of markets arising from this cause; and it much behoves the owners of land in those districts, to remove an evil which diminishes the income they have a just title to expect from their land, to such an astonishing degree.

I might mention several other circumstances that tend to affect the price of live stock, and to influence the choice of the kinds to be kept, and the modes of management of these, respecting the peculiarities of market; but this would lead to too great a length. What has been said may be enough to lead the mind into a train of observation, that may enable any one to form a tolerable judgment of different cases of the sort that may occur.

§ XIV.

Fiscal Regulations that retard Agricultural Improvements.

UNDER this head, as under many others, where the internal prosperity of the country is an object of consideration, *the salt laws* ever present themselves under a most inauspicious point of view. Here, to avoid repetitions, it becomes necessary to refer to the essay on the economical consumption of the produce of a farm, in this volume, in which it will be shewn, that by the liberal use of salt in feeding of cattle and sheep, not only many diseases of the latter might be prevented, but also that the same quantity of food might be made to go much farther, by the judicious use of salt in feeding beasts, than it can do without it; so that were the duty on salt removed, and the free use of that condiment universally adopted, it might be said to augment the quantity of food for beasts, I will not say one half, but in a proportion somewhat approaching to it, over the whole island; which is an article of such

immense magnitude, as almost to baffle all attempts at calculation.

Under the head *manures*, too, it might be shewn what prodigious benefits might be derived from its application to that use, especially in places that are at a great distance from other manures, and to which they are inaccessible, on account of bad roads, and difficult access, but into which this manure, which can be made to operate powerfully, though in small quantities, might easily be brought : so that the public would derive a very great benefit from it under this point of view also.

Salt would likewise prove highly beneficial, in many cases, were it brought within reach of the farmer, by enabling him, on many occasions, to procure a market for the produce of his farm, of which he must for ever be deprived without it. This might have been equally well brought under the former head of this chapter as the present ; but I reserved it for this, that all the baneful effects of the salt laws on agriculture might be brought under view at once. Were I to extend this, to give a view of all the other pernicious effects on the community, it would enlarge this section to the size of a volume ; and would, besides, be deemed foreign to the subject in hand.

There is scarcely a market for fat cattle in this island, that may not be greatly overstocked by the beasts that can be fattened within reach of it, except London alone ; of course, it may be said that every farmer who lies beyond the reach of that market, has the value of his property diminished in a certain degree, from the want of proper markets. In some cases, this inconvenience is but little felt ; as there are other markets which, if not equally good as London, are still considerable : but there are other remote counties, as in Wales, and in the Highlands and northern parts of Scotland, where the possessors of land can *in no way* find a market for cattle that are in a condition for being slaughtered. In these situations, the farmers can never attempt to fatten cattle for the butcher. They must confine themselves to the rearing them only for the grazier. But when it happens that grass, in the feeding districts, fails, or the crops of turnips are destroyed by the fly ; or when the demand for fat cattle from the grazier, is, from any accidental cause suspended, he finds it impossible to purchase the stock from the breeder that he used to do. This stagnation in the market throws the distant breeder into the most embarrassing circumstances. He is not only deprived of the me-

ney he had a right to expect from the sales of his stock, on which alone the farmer, in a breeding country, can rely for payment of his rent; but he is overloaded with a quantity of live stock, so much disproportioned to the winter food he has provided for them, that many of them actually die for want; and he feels himself reduced, in a few months, from a state of comfortable independence, to the most abject poverty. I paint not here from imagination, but from nature. In my own time, I have seen at least half a dozen of seasons, in each of which many hundreds of families have been reduced to the most abject misery from this cause. If those who shall read this, had, like me, seen, with their own eyes, the misery which the families of those poor persons, without any fault of their own, had been made to suffer, they would not have wondered that I should, with so much anxiety, embrace every opportunity that occurs, of endeavouring to obviate evils of the same sort that may be expected in future times to occur; but would heartily have lent their aid to have added force to my feeble exertions. Were the duty on salt removed, all these evils, with a train of others, that would fill a volume fully to enumerate, would be effectually removed. The grazier, whenever a stagnation of market occur-

red, could cause his cattle to be slaughtered, and barrelled up for a future market. The breeder too, who has always at the end of summer a considerable proportion of his beasts that are in good order for the butcher, could, in like manner, have them slaughtered at home in cases of urgent necessity, and barrelled up for market. The very offals of these slaughtered beasts would prove a resource to the poor people, for the subsistence of their families in such disastrous times; and much of that secret discontent, which is apt to provoke either civil commotions, or to awaken a spirit of emigration, would be entirely obviated. I cannot help, therefore, recommending this subject in the most earnest manner to the serious attention of the Board of Agriculture, through whose means the sovereign himself, who so warmly interests himself in the welfare of all his subjects, but who cannot possibly have an opportunity of observing scenes of this nature with his own eyes, may come to be made acquainted with them; who will, doubtless, in that case, most gladly lend his concurrence to any plan for affording relief, that has not a tendency to involve any other description of his subjects in similar distress. He will, doubtless, learn, with some degree of astonishment, if the persons who ought to inform

him shall take the trouble to do it, that while Ireland is supplied with salt and coals from Britain, *duty free*, by which means they are enabled to carry on a very lucrative manufacture to a great amount, in consequence of a very extensive trade in *smuggled* salt to the coasts of Britain, the British subjects themselves are prohibited from the use of these articles, except when burdened with heavy duties; in consequence of which difference of duties, supposing fresh beef were to be sold at the same price in England as in Ireland, the Irish could afford to sell their barrelled beef in England, full thirty *per cent* cheaper than English beef could there be afforded!!! That this is a fact, I undertake to prove, whenever I shall be called upon for that purpose: and I make that offer in this place, because I am sensible it will appear to be a fact of such an astonishing nature, that every one who reads this, and who has had no opportunity of investigating the subject, will be inclined to believe it utterly impossible. But notwithstanding this apparent impossibility, the fact is certain and incontrovertible.

The law respecting parish settlements, the regulations respecting wool, and the corn laws, as they now stand, are all pernicious to the interests

of agriculture. But it would lead us far beyond the limits to which we must confine ourselves in this essay, to enter upon the investigation of these particulars, each of which would form an ample subject for a separate dissertation.

§ XV.

Want of means of circulating Agricultural Knowledge.

HAVING thus brought under the eye of the reader, and the Board of Agriculture, a concise view of those obstructions, of a positive kind, which have, for so many ages, operated as an irresistible bar to the advancement of agriculture in this island, I shall conclude this chapter with some hints for removing an inconvenience of a negative kind; which, if the former obstructions were first removed, would accelerate the progress of agricultural knowledge in this island to an astonishing degree, and give an energy to practical exertions that is unexampled in any other nation.

The ignorance and the obstinacy of farmers, is an inexhaustible theme of declamation, on which many philippics have been written in our age. With what knowledge a great deal of that invective has been written, a due attention to what has occurred in the foregoing sections of this essay will sufficiently show. There can be no doubt, that while the obstructions above enumerated shall continue to operate, it would be nearly with equal justice, that we should revile a man for his indolence and aversion to work, while he was bound hand and foot so as to render him incapable of moving, as to complain of the determined obstinacy of farmers, for not doing those things that were equally beyond their power. Let these obstructions be once removed, and they will be in a condition to bestir themselves; and there can be no doubt but they will be then seen to do it with effect.

From the nature of the business he follows, a farmer must be necessarily confined pretty much to one spot. This limits the sphere of his own practical observation to a narrow extent. He has neither money to spend in buying many books, nor much inclination to put reliance on directions that are published in books, many of which he knows are written by men who have had as

little knowledge of the *practice* of agriculture, as he has of the *theories* with which they bewilder him. Finding himself unable to discriminate between the good and the bad ; and being sometimes imposed upon by a specious title page, to look into performances that promise much, but which he finds upon trial to be worth nothing, if not pernicious, he generally concludes that all writings on that subject ought to be despised. In this way, his knowledge of the practical parts of agriculture necessarily remains limited, as to him and his heirs, for ages entire, to the narrow sphere of his own observation nearly. It is in this way we are to account for a phenomenon that has been long observed by intelligent men, and which is made very apparent in reading the surveys of the different counties laid before the Board of Agriculture ; viz. that a particular and beneficial practice in agriculture may have been followed for ages in one district, while it has never so much as been heard of during all that time in many other parts of the country, where it might be adopted to the great advantage of the parties concerned, and the community at large (*h*). To disseminate the knowledge of these practices universally among the class of farmers in every district of Britain, through a chan-

nel that was not liable to the suspicion of misleading either through ignorance or fraud, and to bring that information to their hand, without trouble or much exertion on their part, and at such a moderate price as to be within the reach of every one, is as yet a *defideratum*; and it would probably have continued to be one till the end of time, had it not been for the institution of the Board of Agriculture, which is in its own nature so perfectly adapted to the purpose, and it seems to be so congenial to the wishes of that Board, in as far as they have been hitherto indicated by their proceedings, that it is to be hoped that a plan for obviating this inconvenience will be adopted, as soon as other preliminary arrangements can admit of it.

What is wanted, is an agricultural journal, to be compiled under the direction of a judicious man, who is well acquainted with the practice of agriculture himself; who has had a liberal education, and opportunities of obtaining a more enlarged knowledge of the practice in different places, than can fall to the share of most farmers to acquire; and who is in such circumstances as to enable him to examine with accuracy any particular about which he may be in doubt, and to state it with precision; and who is, at the same

time, so anxious to guard against leading the unwary into errors, as to be extremely cautious how he holds out hopes to the lower classes of practitioners that he was not certain could never prove delusive. Under the sanction of the Board of Agriculture, such a man could have access to every fact that it was of general importance to be known; and under that authority, such a body of *practical* knowledge could be universally diffused among all the farmers in every part of this island, as never has been yet known in any other country in the world. This would excite an universal spirit of exertion, and that would give rise to new discoveries every day. And discoveries, if published as they were successively made in the same journal, under the controul of the whole practical farmers in the island, would, in the course of a few years, carry this art to a height of perfection that has been hitherto deemed unattainable.

To render this work universally useful, it should be published, not gratis, for that would make it be despised; but at a price below what it could be afforded by a bookseller, or other person who must look for profit from their undertaking. This profit the Board has no occasion to look for, and ought to sacrifice, together per-

haps with a small sum annually, for moderating the price still farther; because it should be adapted to the circumstances, not of the most wealthy farmers, many of whom stand in little need of instruction; but of the inferior orders, who have had fewer opportunities of having their minds enlarged.

In order to render this publication accessible to those, also, who have the most occasion for it, by living in remote districts where literary information is rare, this journal ought to be permitted to be sent by post, free, to every part of Britain; and, doubtless, for such a national benefit, where private emolument is out of the question, parliament would have no difficulty in granting this exemption under due precautions for preventing the abuse of it. To render this exemption nothing burthenfome to the mail, two devices might be adopted: the *first* would be, to have this journal published at short intervals, by which the weight of the same number of copies would be less, and more equally divided, than if the same matter were put up in thicker numbers. The *second* would be, to forward it from London in such a way, as that it might reach the place of its destination in every part of the island upon the same day: of course, the parcels of the same

number would not all go by the mail in one day, but on different days, according to the distance of the places from the capital: and the best day that could be fixed on for the delivery, would be Sunday, or on the market day in a town; because, in distant parts, the whole packet for one parish, if sent to the parish church, or the market town, could easily be conveyed from thence; and, in other places, it would, in general, be the most convenient day for receiving it. Under these two regulations, no inconvenience could result to the mail. The revenue could suffer no loss; because it is very plain the work could never be published so as to go by post as letters. It would even prove a considerable augmentation to the revenue, by the additional duty on the paper it would consume; so that no objection from the Revenue Board could lie against the measure.

If a man could be found, who was capable of keeping himself perfectly independent of all parties; and who should invariably direct the attention of his readers steadily towards objects of agricultural and georgical research alone, regardless alike of those objects which for a time seem to affect the interest of the minister or his opponents, it would prove one of the most valuable

performances that has appeared in any language; and would form an interesting epoch in the history of Great Britain. But is it in Britain that such a man is to be found? perhaps in the present age it may be deemed impossible.

It may, indeed, perhaps be difficult to find such a man: but I fear it will be still more difficult to find a body of men of high rank in this island, who will take an active hand in promoting any public undertaking, that does not seem to be calculated, in one way or another, to be converted into a political engine capable of forwarding the views of a party, or the private aims of individuals. In the present times, it would perhaps even be a matter of some difficulty, to find a very large body of readers, who would be so much interested in any publication that did not enter into political discussions, or scandalous anecdote, who would peruse it with continued attention for such a length of time, as would be required fully to effect the purposes here proposed. From these considerations, I fear the plan will have too much of an Utopian perfection ever to be carried into practice; or, if ever it shall be attempted, it will require a greater degree of steadiness in the conductor of that work, than can reasonably be expected in man,—to suppose that, assailed as he

would be by so many tempting lures on every hand, he should be able to persevere, without wavering, in the right path for any considerable length of time. But though the utmost degree of perfection can never be attained in this life, men ought not to be deterred from proceeding as far in the right path as they can. It is with this view, that the foregoing hints have been thrown out to the public on these numerous topics which have come under review in the present essay.

The above proposal has now (Feb. 28, 1798) been before the public for the space of more than one year, without seeming to have attracted the notice of the president or any member of the Board of Agriculture; and from the unlucky turn in politics, that the president of that board has lately taken, it is much to be feared that little cordial co-operation can be expected between him and the minister on any subject, so that the efforts of that Board, if, even directed by superior wisdom, must be considerably cramped compared to what they otherwise might have been. There is not then the most distant probability that ever this proposal will be carried into execution under the auspices of the Board of Agriculture. That such a desirable object, however, may not be left wholly unattempted, I intend to make agricul-

ture a particular department of a periodical work that I have some view of engaging in at present. And tho' this must fall greatly short of what might have been accomplished, if the above plan had been carried into effect; it may still be of some use.

THE END OF ESSAY FIRST.

ESSAY SECOND.
ON
WASTE LANDS,
AND THE
MEANS OF THEIR IMPROVEMENT.

VOL. III.

O

*Labor omnia vincit: sed sine lucro industria
languit.*

ANONYM.

ESSAY SECOND.

ON WASTE LANDS, AND THE MEANS OF THEIR IMPROVEMENT.

LANDS, whether private property, or commons, lying in a neglected state, may be denominated wastes. These lands may be improved either by being brought into cultivated fields, or by being planted with trees, which will require to be separately considered.

PART FIRST.

On the Improvement of Waste Lands, by means of Culture.

AS I have had occasion to consider the influence of the right of commonage, in the foregoing essay, my views shall here be confined to the consideration of the practical means of improving waste lands, supposing the person who undertakes this task, to be at liberty to adopt the measures that shall appear to him to be most expedient for that purpose.

§ I.

Preliminary Observations on the circumstances that require to be adverted to, before the Cultivation of Waste Lands should be attempted.

THERE are very few soils that may not be converted into corn-fields by human exertions judiciously applied; but there are many cases in which that melioration cannot be effected, but at a greater expence than will afford a reasonable indemnification to the improver: it therefore behoves every one, who has such improvements in contemplation, cautiously to consider all the circumstances that can affect his operations; to weigh deliberately the influence that each may separately have in his particular situation, and, after having taken a complex view of the whole, to adopt those measures only that afford a reasonable prospect of indemnification for the outlay of stock and labour upon the undertaking. The following are among the principal circumstances which ought to be adverted to in a case of his sort, as any one of them, being in favour of the undertaking, or in opposition to it, may have the effect of turning the balance either to the profit or loss of the account.

1st, The nature of the soil, and subsoil of the subject in question.

2^d, The physical obstructions that stand in the way of cultivating that soil, as arising from rocks or stones, brushwood, trees, &c.; hurtful moisture, whether arising from springs or surface water, whether temporary floodings, or permanent soaking; inequalities of surface, whether occasioned by pits dug out, or heaps raised up, or from the natural swell of mountains or great acclivities, that may retard the operations of agriculture.

3^d, The climature, whether respecting the general quantity of rain that falls, or the particular seasons of the year at which these rains usually happen; the degree of heat or cold that there prevails, and the particular modifications it admits of from the peculiarity of circumstances; the quantity of snow that falls, and the time it usually lies; the winds that chiefly prevail, and the shelter or exposure that the form of the ground offers in that respect.

4th, The vicinity or the distance of the place from towns or markets of any kind; the size of these towns, and the extent and universality of the markets within reach.

5th, The kinds of extraneous manures that can be purchased; the price at which they can be

obtained; the distance from whence they must be brought; the times at which they can be got, and the quantities that can be procured at once, or in a certain order of succession.

6th, The nature of the roads or other means of communication, to or from the premises; whether these be steep and hilly, or level and plain; whether they be hard and rough, smooth and firm, or deep and miry; whether they be equally passable at all times of the year, or during particular seasons only; or whether, from the state of the country, they are in a train of amelioration or the reverse.

7th, What conveniencies the premises afford for erecting houses, rearing fences, making drains, and other necessary operations.

8th, How the premises stand affected respecting water; whether for the purpose of flooding the lands at pleasure, or of fencing it off for the purposes of amelioration; whether for family uses, or for the conveniency of live stock in inclosures at all seasons.

9th, The state of the premises respecting fuel, the kind and quantity that can be commanded, and the price at which it can be afforded.

10th, The state of the country respecting servants and labourers; the wages and mode of en-

tertainment that prevails in the district respecting servants; the way in which they have been accustomed to work; the practices that are there established, in regard to working hours, management of teams, carriages and home labour of every sort; the kinds of work that the custom of the place has rendered too servile to be performed by particular descriptions of servants; the manner in which assistance can be procured in these respects; whether extra-labourers can be obtained for hire, in sufficient numbers, when a particular push happens; or whether they must be engaged afar off, and kept in employment when not wanted, to serve at that particular push; whether it is the custom to pay labourers wholly in cash, or partly in victuals and drink, and in what proportions, denominations and quantities: whether work can be got done by the piece, or by time only, with many other items respecting this head.

11th, The state of the country respecting mechanic arts; the facility, or the reverse, with which labouring utensils of all sorts of a good construction can be made or repaired, and the stile of expence that custom has established in regard to this department of rural economy.

12th, The nature of the tenure by which the lands are held; the rent that is exacted from him, and the nature and amount of other claims that he must expose himself to in consequence of his occupancy or operations, whether this be under the name of land-tax, tithes, poor's rate, road-money, repairs of houses or fences; the length of his lease, the probability or the reverse of his being made to incur expence by law-suits, in consequence of arbitrary exactions; and every other circumstance that may render his tenure more precarious, or his property less secure: for, in most undertakings of this sort, a man may be said to "cast his bread upon the waters, which can only return to him after *many days*;" and he ought well to consider, before he throws it out, what is the risk of its being snatched from him or his family before it can be returned again.

A man, who attentively considers all these circumstances, may be able to form a tolerable idea of the *kind* of improvement the subject admits of, and the *degree* of amelioration of which it is susceptible, on the supposition that he himself is capable of conducting the requisite operations in a proper and judicious manner; but any person who sets about agricultural improvements, without having previously weighed all these particulars, may be compared to that man who should

embark on board a vessel in an unknown sea, without a compass, who may land he does not know where ; and ten to one if he is not wrecked upon some unlooked for shore.

To give particular directions how to proceed under every variation of circumstances above enumerated, would greatly exceed the bounds to which I must here confine myself: nor does this seem to be absolutely necessary, seeing it would be the wildest scheme imaginable, for any man who was totally unacquainted with the practice of agriculture, to engage in an extensive undertaking of this sort, were he even furnished with the most minute and accurate directions that could be given; because he would find it impossible to apply these directions properly in all cases. To such a man they would be useless; and to a man who is already acquainted with the practice of agriculture, many of them would be quite unnecessary. All that can be done, then, in this case, with any seeming degree of propriety, is to mark the great outlines of practice that may safely be pursued in a few cases that are widely discriminated from each other, leaving the judicious cultivator at liberty to exercise his judgment, in properly varying his practice so as to make it apply to the intermediate

cases according to every gradation of circumstances.

The neighbourhood of great towns peculiarly favourable for the improvement of Wastes.—The greatest enterprises in regard to the improvement of waste lands, may be made with success in the near neighbourhood of a large town which, from its situation, is cut off from having ready access to a fertile soil on any side. In such a situation, a price so very tempting is held forth to the person who shall bring to market fresh esculent productions for the table, and succulent food for cows, horses, and other animals, and for other weighty productions that cannot admit of being brought from a distance, unless at a great expence, as affords a strong allurements to men of property to risk their capitals in agricultural improvements, in the hope of benefiting their families by a permanent income out of the land which they thus reclaim from barrenness, at the expence of a fair purchase price. In these arduous enterprises, which can only be undertaken to their full extent, where personal property is secured from the danger of casual attacks from any quarter, which might render the permanency of that income doubtful, the very possibility of

succeeding often depends on the one hand, upon the great quantity of manure, that can be obtained from from the city, in proportion to the extent of ground that can be cultivated near it; and, on the other hand, upon the price that can be obtained at hand, for articles, such as stone, sand, clay, stubs of tree-roots, &c. which could not have been otherwise cleared off the ground with the smallest prospect of reimbursement. In situations such as that I here describe, the utmost possible proportional melioration of waste ground cannot be estimated with accuracy. There are few, if any soils so bad, as that, in these circumstances, under a skilful management they may not be converted into rich fields permanently productive. I have certainly seen many fields thus situated, which, in the course of a few years, have been put into a train of yielding an annual produce of perhaps *one thousand* times the amount of what they ever could have done if left in a state of nature.

The importance of this fact, in regard to the welfare of a state, deserves to be carefully adverted to. It brings forward, under a striking point of view, at the same time the *possibility* of augmenting the subsistence of man to an astonishing degree, and the facility with which this kind of *creation*, if the phrase be allowed, might for ever

be prevented from taking place. For if all the waste grounds in the neighbourhood of the town had been a *common*, no improvement could have ever taken place upon it so long as that common remained. And if the persons having interest in that common are numerous, it will be impossible ever to bring them to consent to an amicable division of it: and if it be attempted to be divided by the authority of Parliament, the expences that must be incurred before it can thus be effected, will be very great; in consequence of which that improvement, which without this obstruction could have been made with a prospect of a reasonable profit, cannot now be attempted without a certainty of loss. For this reason, the enterprise must be abandoned; and the land must be doomed to remain for ever an unprofitable waste.

No expence should necessarily be incurred, but that which tends to remove physical obstructions only.—The same reasoning will apply to every case where the improvement of waste land, under any circumstances, is in contemplation. In the neighbourhood of large towns alone, the expence incurred in improving *the most barren* wastes can be repaid. As you recede from these great marts, it is necessary that the soils be of a

greater degree of fertility, before the expence of cultivating them can be repaid ; and still the farther you recede, and the more unfavourable the markets, and the less abundance of extraneous manure that can be obtained,—the richer and richer must the natural soil be, before the expence of cultivating it can be repaid ; and consequently, the smaller will be the proportion of waste land that can be brought into cultivation. In all cases, however, whatever extraneous expence comes to be added to the sum that is required to remove the absolute *physical* obstructions to the cultivation of the soil, must of necessity make a proportional narrowing of the possible sphere of improvement. This is a proposition as plain as any in Euclid ; and an unavoidable corollary from it, is, that every shilling that is laid out by individuals, in their private capacity, for procuring acts of parliament for the division of commons, and for removing other *political* obstructions to the progress of agricultural improvement, is a most impolitic diminution of the actual productions of the country,—a defalcation from the subsistence of the people,—a cause of enhancing the price of provisions beyond the rate that nature had intended,—and of thus retarding the manufactures, the trade, the national prosperity

of the country;—and, by the abstracting of them, producing a diminution of the population and the revenues of the state.

No share of the profit arising from the improvement of Wastes should be abstracted from the undertaker.—The same reasoning will apply to every other circumstance, under whatever form it shall be brought forward, that tends to narrow the security, or to diminish the profits of the operator on waste lands. It is evident, that no man can cultivate waste lands, unless where he can have a full return for the outlay of his stock and labour. In every situation, there is one certain degree of fertility of soil, which will barely admit of a return for the money that must be expended in removing the mere physical obstructions to improvement, and no more. In all such situations, if the undertaker has a permanent security, that he shall be allowed to reap the *whole* profit that he can derive from the sale of its *total* produce, he may proceed in that improvement; but if he knows that he will not be allowed to dispose of that produce, he *cannot* proceed: and those soils which, in the first instance, might by his industry have been converted into productive fields, must, in the other case, be doomed to remain, till circumstances alter, in the state of barren wastes.

On this principle, the pernicious tendency of that ill-judged tax upon industry called *tithe*, comes once more in our way as an evil that is very apparent; a tax that, without producing any good in these circumstances to those who claim a right to demand it, has operated, perhaps more than all the other taxes in this country, to retard the progress of agriculture, and to diminish the national prosperity: yet, wonderful to tell! there are men in this enlightened land, who are not ashamed to say, that they do not conceive the drawing the tithe in kind can be accounted the smallest obstruction to agriculture!!!

It was necessary that I should thus state, with as much clearness as the brevity to which I confine myself will permit, the circumstances that have operated, and must for ever operate, in a most powerful manner, so long as they shall be permitted to exist, towards the preventing the improvement of waste lands. For, without taking these circumstances into the account, to prescribe rules for overcoming the mere *physical* obstructions to the improvement of waste lands, and to talk as if that were all that was necessary for establishing a general spirit of vigorous enterprise in the cultivation of them, would be a species of

charlatanerie that it would be as unbecoming in the Board of Agriculture to countenance, as it would be unworthy of my own private character to adopt. That Britain is susceptible of very great improvement, there can be no doubt: that it is *physically* capable of being brought to afford, to speak in the most moderate terms, *ten* times at least the amount of its present produce, admits of the clearest demonstration: but that it *will* advance in productiveness, while the present system in respect to the private management of agricultural concerns, and of legislation affecting rural affairs prevails, seems to me to have not the smallest degree of probability. On the contrary, it will be discovered, at last, that the diminution of agricultural produce, which has been so obviously perceptible for some time past, will become still more and more apparent, in proportion as men shall withdraw their capitals and skill from the practice of agriculture, and apply them to some other profession that will render them more independent members of society, and afford them more adequate returns for their industrious exertions.

Agricultural enterprises in England less profitable than those in trade or manufactures.—In

the foregoing essay, I had occasion to take notice of the circumstances that chiefly obstruct the agricultural enterprises in *England*, by means of which the industry of that active people is forced into another channel: some of which not affecting Scotland, it there becomes, in some cases, a matter of calculation, to ascertain whether it will be most adviseable for an individual to apply his capital and skill in agriculture, or in trade or manufactures.

Difference between England and Scotland, in regard to agricultural improvements.—Upon these principles, there are many instances of men in Scotland, vesting a *small* part of their capital in the purchase of waste lands, and appropriating the remainder of that capital towards the melioration of the subject, with a view to future profit, as they would do in any other employment; and, as might have been expected, it has been done with greater or less success according to circumstances. In many cases where this has been attempted, the undertaking has been both arduous and hazardous. The original purchase-price of the land has, in some cases, not amounted to one hundredth part of the neat expence incurred, before the subject could be let for a

steadily permanent income. A great part of the expence incurred, in many instances I have known of this kind, has been occasioned not so much by the melioration of the soil itself, as by steps that were merely preparatory to admit of those operations which were necessary for its actual melioration. The clearing the ground of stones, in particular, is a very heavy charge in most cases ; and, in some cases, especially where large hard bullets of whin-stone or granite abound, which must be blasted by gunpowder before they can be brought to a manageable size, the unavoidable expence is exceedingly great : and as those stones are often concealed beneath the surface, the amount of that expence admits of no previous accurate calculation. But as these stones must all be cleared away, at whatever expence it may be, to the full depth of a plough furrow at least, those who engage in undertakings of this sort, usually find it most economical, upon the whole, to trench the ground to the requisite depth, by which means alone the stones can be accurately discovered at once, so as to avoid a series of endless future operations. Under this mode of improvement, I have seen fields cleared where the stones were in such quantities, as that, finding no other mode of consuming them, but by putting them

into walls reared as fences round the fields, there was a necessity for making the walls from six to nine feet in thickness, on purpose to consume the whole of the stones, although the fields were divided into inclosures not exceeding two acres in each. In cases of this sort, the undertaker never looks for a return of the *capital* sunk on the premises by the *annual* produce ; but is perfectly satisfied with this success, if he can let the lands at a permanent rent, which shall be equal to five *per cent.* of the whole money thus expended ; being either satisfied with the legal interest of his money, if his circumstances admit of it ; or, if he requires his capital, he has only to sell the subject, when he is certain of receiving from 25 to 30 years purchase of the gross rent,—which improved capital he may either apply to another undertaking of the same kind of still greater extent than the former, or to any other purpose he may incline.

The cultivation of wastes a sort of business in Scotland.—In this way, the improvement of waste land becomes a regular business, of the same nature with that of trade or manufactures, that a man may look up to with an assured hope of profit. It is in fact a species of manufacture itself;

and a manufacture too, which, being of a more beneficial tendency, deserves to be encouraged above all others. By its operations, employment is given to a great number of hands; and the persons thus employed, instead of being crowded into towns,* (as in most other manufactures) where their health is injured, and their morals corrupted by the infectious contagion of bad example, are allowed to retain the primitive simplicity of manners that the habits of a country life so necessarily insure; their whole exertions meanwhile are employed in augmenting the quantity of human food, and in adding, in the most direct manner, to the population and wealth of the state, and internal prosperity and stability. Should this kind of employment be encouraged, who can set limits either to the population, or to the productiveness of these kingdoms?

Illustrated by a practical example.—I wish to impress the mind of the reader with a strong conviction of the necessity of adverting to the circumstances which prevent similar exertions being made in that part of the island which is most susceptible of it, when compared with those that often occur in that part which is less favourably circumstanced. In the last situation, it is no un-

common thing for a man to expend at the rate of sixty pounds *per* acre, before he can bring his lands to be let to a tenant, and the undertaker thinks himself abundantly repaid, if he can get three pounds of *gross* rent. In Scotland there are few or no deductions to be made from rent. The land tax, in this case, having been fixed before the improvement took place, when the land was worth next to nothing, is so small as to be of no account: and neither tithe, nor poor's rate, nor any other parish taxes, are exigible from such lands; so that the whole of the gross rent the lands can afford comes directly into the pocket of the undertaker; in consequence of which he draws a free annual income of 5 *per cent.* for the money he has thus expended, and he is thus encouraged to proceed.

In England the case is different. There are so many deductions to be made from the gross rent the farmers pay, that the proportion of free rent which remains to the landlord, is much less than in the case above specified. An example will make this plain. Let us suppose that 60*l.* *per* acre has been expended, and that the productiveness of the improved land is equal in both cases; taking then the usual computation, that the rent of an arable farm should not exceed one

third part of the value of its total produce, the total value of the crop in this case would be *nine* pounds *per* acre; the tithe of which, if drawn in kind, will of course be equal to 18 shillings. If the poor's rates, and other parish charges be equal to 6 shillings in the pound, (and it appears by the surveys that these rates are higher in many places,) this, upon 3l. of rent, would amount also to 18 shillings; in all 36 shillings to be deducted from the original 3l. which would leave a free rent to the undertaker in England of 1l. 4s. only, instead of the 3l. which the tenant actually pays, and which the improver, in Scotland, actually receives. At this rate, instead of the five *per cent.* he had actually drawn for his money, he would be entitled to draw in England only *two per cent.*: of course, that business which it might have been practicable to pursue, in the one case with a reasonable profit, would be, in the other case, productive of the most certain ruin; and must be totally abandoned: and abandoned for what? Not for the benefit of the tithe-owner; for, in this case, the tithe-owner can never be benefited by the land in question one shilling; nor for the benefit of the poor, who never can derive any emolument from it, while it is allowed to remain in its unproductive state: The power

therefore conferred by law, to exact both these taxes, is calculated to produce only mischief. Doubtless it could never be the intention of the legislature to authorise laws of such a pernicious tendency, with an intention to destroy, in such a direct manner, the effective industry of the nation. It can only be ascribed to that kind of imperfection, arising from want of foresight, to which all human institutions are liable. It is experience alone that can discover evils of this sort; but, after they are felt and pointed out, it is the province of a wise and beneficent legislature to correct these oversights, and to redress the grievances to which they have given rise.

Lands to be appropriated in lieu of tithes, considered.—A device has been adopted in England, in some cases, with a view to mitigate the evil pointed out above, respecting tithe. Where commons are divided by authority of parliament, a certain proportion, usually I think one ninth part, of the soil has been set apart for the tithe-owner, in lieu of tithes from the whole. This doubtless does diminish the evil, because it at least allows the owners of the remaining eight ninths to proceed with their improvements in as far as respects the tithe. But besides that this remedy

can only be applied in cases where a special act of parliament is obtained for the purpose, and therefore can never afford relief to those who might find a propensity to improve their own undisputed property, the cure itself produces a disease which is little less fatal, in many cases, than that for which it affords a remedy: nor does that remedy afford such a radical national relief as a beneficent legislature should aim at.

It is very plain, that if the tithe-owner be a clergyman, the portion of waste ground allocated to him can prove of no emolument whatever. He has not the right to sell it for the trifle it would bring, in its present uncultivated state, were he even to find one who was willing to purchase it: the laws of the church prevent that. He cannot improve it himself; for, had he the money at command, common sense would prevent him from sinking a great capital of his own with a certainty of being able to draw perhaps not legal interest for it during his own incumbency, and, at his removal or death, to deprive his heirs for ever of the capital sunk on that improvement. This portion of the waste then is locked up from all prospect of melioration for ever; and neither can benefit the clergyman to

whom it has been awarded, nor any other person.

All the reasoning above is on the supposition that the waste is of the very unproductive nature of the case adduced, and is merely illustrative: but whatever be the state of the subject in question, the same reasoning applies, *in kind*, though not in *degree*; as that will be varied by the productiveness of the soil, and other circumstances. This is indeed very evident; but I think it necessary thus to state it, to obviate the remarks of hasty inconsiderate cavillers, who, on an intricate question of this kind, may be expected to be sufficiently numerous. There are cases of a more favourable nature, which I need not here specially particularize.

The improvement of waste lands should be conducted by actual farmers.—Though very spirited exertions have been made, in some cases, in the improving divided commons in England, yet, from the obstructions above stated, and others that will come under review in the sequel of this disquisition, the influence of these exertions has been much circumscribed, in comparison of what it would have been. Every agricultural exertion that is to be attempted by men who do not

make a profession of that business, must be conducted with an uneconomical expenditure of capital, which would have been much diminished, had the operations been conducted by a professional man. It were unnecessary to add, that such expenditure tends to diminish the rate of profit on such enterprises considerably below that which it otherwise might have been. This consideration plainly indicates, that in all cases where the expenditure required for cultivating waste lands is not beyond the faculties of the *farmer*, such arrangements should be adopted, as to throw the burthen of these improvements upon him, if it be possible.

Apathy of farmers, circumstances which occasion it.—But, it is a pretty general rule, that persons, who follow the profession of agriculture have little more money than what is barely sufficient to purchase stock for the farms they rent, and to carry on the usual operations of a farm; so that it would be vain to expect that they could afford to make the advances for the amelioration of waste lands, that are *nearly* in the same state of unproductiveness with those above enumerated. Their highest views are, for the most part, directed to those immediate *annual* returns which can

be got from their farms by means of home manures, and an economical arrangement of their domestic management, without looking forward to those national benefits that might in many cases accrue from their spirited exertions in meliorating waste lands, in proper circumstances. This kind of apathy I am far from imputing to these men as an object of blame. It is a necessary consequence of that state of insecurity in which the prejudices of the times has contrived to place them. So far am I from blaming these men for their inactivity in this respect, that I should think them highly culpable, indeed, if they did adopt another mode of conduct: but of this there is little danger to be apprehended, so long as they shall be kept in that species of depression to which they are at present subjected; for common sense has wonderful power, when supported by necessity.

Insecurity of tenure stops the improvement of Wastes.—It may perhaps be deemed a tautology, but I hope to be pardoned for once more remarking, that leases for an uncertain period, or for a small number of years, clogged with injudicious restrictive clauses, are productive of the same effect upon the conduct of the farmer. They all

tend to produce a sordid kind of dependence upon superiors, which sinks the spirits into a grovelling depression that is perfectly destructive of that elevated ardour of mind on which every active pursuit must ultimately depend. Were farmers allowed a reasonable length of tenure, and were they at the same time freed from ill-judged restrictions, the case would be very much changed in a short space of time. They would soon perceive that, from a judicious outlay of such money as they could command, towards the melioration of such soils within their reach as were susceptible of it, very considerable profits might be derived: this would soon produce astonishing efforts;—for none but those who have particularly adverted to it, can conceive what energy the drawing a little profit, with the agreeable prospect of obtaining more, gives to the exertions of man. This rouses all the faculties, keeps the attention continually awake to mark every little circumstance and incident, and to turn it to advantage. When once put into this train, the farmer may be fairly left to himself. Is he ignorant, he will soon acquire knowledge through a thousand channels that he alone can discover: and every day will add to his skill and his energy. It is impossible not to perceive, though it is unnecessary for me to

state it particularly, after what has been said in the preceding essay, that the consequence of this energy must redound greatly to the emolument of the proprietor, and the productiveness of the country.

Inclosed lands may sometimes be called Wastes.
—It is not merely in regard to the improvement of those lands which are called *wastes*, in the common acceptance of the word, that the alteration above proposed would prove a great national benefit: there are many millions of acres, lying scattered throughout the different counties in England, which, though inclosed, and the property of individuals, may be fairly entitled, as I conceive, to the name of wastes; because they do not, in their present state, afford one fourth part of the produce that they might easily be made to yield. These fields, by an injudicious system of management, having been laid down to grass without being brought into a state of productiveness sufficient to allow them to admit of their being meliorated by that management, are now prevented from being broken up so as to bring them to a proper degree of fertility, and have thus degenerated into a deplorable state of sterility. Many of these fields, consisting of a

poor thin hide-bound clay, produce only a very scanty quality of four unwholesome grasses, which no domestic animal will eat, unless when at the point of starving. Others are covered with a full coat of fog, (moss) that excludes almost the very appearance of any other plant whatever; and others are so thickly overspread with ant hills, as scarcely to let the appearance of the natural sward be seen in any part of the field. Under the unrestrained management of a person whose knowledge was improved by a sense of his own immediate interest, all these crying abuses would be quickly corrected, and in a few years those fields, which are now a disgrace to the country where they are suffered to remain, would be converted into a fertile state, affording abundance of wholesome produce both for man and beast.

Were this judicious system of management universally adopted, the profession of agriculture, like that of manufacture or of trade, would be looked up to as an employment in which a moderate stock might be applied with a reasonable prospect of acquiring, by industry and good conduct, both a comfortable subsistence to one's family, and a moderate competence of wealth. In that case, a farmer would find it useful in general not to lay out his whole stock on cattle and im

plements,—for feed, and servant's maintenance, as at present; but rather to reserve a part of that stock, for the purpose of purchasing manures, making drains, embanking rivers, levelling high ridges, removing stones, grubbing up useless stumps or brushwood, and other substantial improvements that the state of his farm might render necessary. He would not then be under the necessity of abstaining from such operations as could not make a full return to him, *within the year*, but would find himself enabled to rest satisfied with such moderate returns as would only clear his capital to him *after many years*. In that case, there would be no need for gentlemen of great landed property trying to instruct their tenants in the proper mode of prosecuting their own business; for they themselves would search for it, and obtain that knowledge in a much more perfect manner than any other person could devise for them. Plenty would abound in every corner, if, with that superabundant plenty, a ready access to markets, on reasonable terms, be not prevented; and peaceful content would be the natural result.

Necessity of adverting to the foregoing circumstances.—Let not these observations be accounted an unnecessary digression in this place. It is,

doubtless, the intention of the Board of Agriculture to point out to the public the most effectual means of rendering the waste grounds of this country productive to the state. Had I proceeded merely to give direction how these waste lands *may* be managed so as to be rendered productive, while I was conscious, at the same time, that there are thousands of honest farmers in the kingdom who know that part of the business as well as myself, and therefore stand in no need of such instructions, but who are prevented from acting, because of the operation of the causes above assigned, I might thus have made a vain and idle display of knowledge which might have tended to impress a few with an advantageous idea of my own acquirements, while these directions, like thousands of others that have been distributed with a lavish hand to the public, could have proved of very little avail. Applause, upon these terms, I shall ever despise. Before instructions can be of real utility, circumstances must be such as to render it practicable to carry them into effect; so that, without adverting to the circumstances above stated, I consider all that follows merely as words of no effective importance, which I should never have taken the trouble of putting upon paper, as it would be only a pain-

ful exertion without any beneficial tendency. In hopes that men may be put into such circumstances as to be able to avail themselves of the hints that follow, which are the result of a pretty extensive practice in the melioration of waste grounds, I shall communicate them to the public with pleasure ; conscious, in the first place, that they will not prove a snare to those who are ignorant ; and hoping that they may, perhaps, in some cases prove useful even to those who are better informed.

§ II.

Practical directions for bringing waste lands into cultivation.

PART FIRST.

Of the improvement of waste lands as connected with a cultivated farm.

THE most favourable circumstance for the improvement of waste land, by those exertions that are within the reach of a farmer, is that the

waste is in the near vicinity of an arable farm, and connected with it. In this case, the farmer, by a small addition to the strength of his labouring animals, can annually cultivate a portion of the waste land without much inconvenience to himself. Many are the advantages arising from this arrangement: the expence of erecting new houses is avoided; food for sustaining his labouring cattle is already within his reach; which, on a compleat new undertaking on waste lands, is an obstruction that is extremely difficult to be surmounted; a strength sufficient can be spared to labour the waste ground that is under cultivation, or in its progress towards it, at once, when the proper season requires it, while the servants and horses have employment at seasons when they could not with propriety have touched the new ground. Lime or other manures can be brought in abundance for the newly cultivated fields, at the season of the year when circumstances render it otherwise most convenient; manures can be afforded from the farm, for bringing the waste more quickly into tilth, than in other cases. In short, there are a variety of other lesser circumstances, which all tend to smooth the difficulties that would otherwise be experienced in an undertaking of this sort.

How to bring waste lands as soon as possible into the state of profitable grass lands.—The object that an improver of waste lands ought to have chiefly in view, should be, to have it laid down into *profitable* grass land as soon as that can be *properly* accomplished; for the moment it is laid into grass, in these circumstances, it ceases to be a burthen upon the operator: it no longer requires manures, but rather furnishes manure to the less improved fields; and affords, at the same time, food for the beasts that are required for the proper management of the land.

But do not omit to observe, that it ought not to be laid into grass, until this can be *properly* done. No ground can ever be laid into grass with a judicious attention to economy, but when it is in a state of great productiveness and high *tilth*. I know not any one branch of husbandry in which more people err than in that which respects the laying down ground into grass. When agriculture was in its infancy in this island, an idea seemed to prevail, that no ground, which ever had been under tillage, should be laid down to grass, so long as it was capable of producing a crop of grain that would pay for seed and labour. That notion is now pretty much exploded; but even, at this hour, there are only a few

persons who are sufficiently aware of the very great difference of profit that the farmer is able to draw in the course of a series of years, from a field laid out to grass, in the *richest state possible*, or in moderate condition only. Were I here to state this particular to the *full* extent, it would appear to be exaggeration, for which reason I omit it: but I hope the inexperienced reader will take my word for it, when I say that it is much greater than he can easily imagine; and that, therefore, he should be very cautious never to loose sight of this maxim, in his attempts to reclaiming waste lands.

The necessity of not attempting to do too much inculcated.—To obtain that high degree of fertility as quickly as possible, the undertaker should be cautious not to push forward with his improvements faster than the circumstances he is in will permit: and, in particular, never to go beyond the bounds that the manures he can command are sufficient to accomplish *completely*. More people have been ruined, in enterprises of this sort, by attempting to do *too much*, than by any other circumstance whatever. There is something so pleasing in the idea of going forward with rapidity, that many sensible men have

been seduced by it to their own undoing. "Do what you do *compleatly*," is the maxim of wisdom in this case. If you can do twenty acres well in a season, good, go on with it. But if you are stinted in manures, go just as far as they go, giving a full, rather an under allowance; but go not an inch farther. If these cover ten acres, five acres, one acre only, seek to do no more. this will repay your expences fully, and afford you pleasure as well as profit. But to bestow much labour and expence on a large surface of unproductive soil, is attended with great waste of funds; and the hungry appearance of the crops is irksome to behold.

Lime, the most universal manure for unproductive lands.—Of all the manures that can be obtained for improving waste lands, nothing is equal to lime, or other calcareous matters. In every undertaking of this sort, therefore, the first consideration ought to be, where can lime be obtained (*i*), at what price, and in what quantities? Unless this or some other calcareous manure, can be obtained in sufficient quantity, and at a reasonable price, I should consider the improvement of an unproductive waste of considerable extent, as a very hopeless undertaking; but where that

manure can be obtained in abundance, and at a cheap rate, there are very few soils so barren, as, under a proper management, may not by degrees be very much meliorated.

But lime, *on poor* soils, is a trifling and inefficacious manure, unless where it is applied *in very considerable quantities at once*. A chaldron, or half a chaldron *per* acre, I should consider as nearly as efficacious, in this case, as sprinkling a pinch of snuff. Six hundred bushels of slacked lime *per* acre, I should consider as not an overdose; and less than three hundred I should account too little, in almost any case.

Great as this quantity of manure may appear to some persons, I should by no means consider it alone as an abundant dressing for poor ground, newly broke up from waste fields. To bring it into the proper heart, I would require, if it *can be obtained*, from 50 to 60 cart-loads of yard dung, as much as two horses can properly draw upon ploughed land, *per* acre. With this dressing, if the ground be not brought into proper tilth, the soil will be very indifferent indeed, and subjected to bad management, if it be not made fertile for ever.

Dung ought to be conjoined with lime.—Many persons will think it unnecessary to employ both dung and lime at the same time; as they would think that either of them separately would be sufficient. This is upon the *starvation* system, which I consider as the bane of farming. The fact is, that when lime and dung are thus conjoined, (I do not mean to say mixed together, before being used, but only employed in the same season), they produce more powerful and aggregate effects, than if either had been separately applied: so that much benefit results from this practice. Lime, as I have elsewhere said, [Agricultural account of Aberdeenshire, and Essay on Quick-lime as a manure, in the first volume of these essays], acts both as an alterative and a fertilizer. In its alterative capacity, it not only enables the soil to produce crops it never otherwise could have yielded; but it also enables dung to operate upon the soil, in a manner it never otherwise would have done. Of the two, lime alone is better than dung alone, on unproductive soils. I have seen some soils on which dung alone produced very little effect.

To apply these manures, then, in *great quantities together*, is beneficial; but it is chiefly beneficial, if care be taken not to exhaust the soil

after it has been thus enriched, before it be laid down into grafs. This I hold to be a fundamental maxim in farming,—“Where you have waste grounds to improve, take the earliest opportunity you can to enrich your ground to the full; and when you have it so enriched, and brought into proper tilth, lay it down immediately into grafs, to remain in that state till you have brought the whole of your fields into the same condition.”

Newly broke up land should be kept under tillage, for some time, and old corn land laid into grafs.—But before ground that has been broke up from the state of wastes, can be laid into grafs with full advantage, even after this abundant manuring, certain precautions are necessary, which ought by no means to be overlooked. Most land that never has been cultivated is, to a certain degree, in a four crude state, that renders it unkindly, in a special degree, for the production of grafs. To fit it for that purpose in the most perfect manner, frequent plowing, long exposure to the air, and repeated dungings, are required. In the situation here described, this can often be done by converting part of the old arable farm into grafs, and continuing the new broke up lands for some time in tillage, under a judi-

ous rotation of crops, and an enriching system of management. This system of making an interchange between grass and corn land, is extremely beneficial : for old corn land, that has been unfit in some measure, for the production of healthy grain, and abounds in destructive weeds, which are extremely prejudicial to the farmer, is in the very fittest state that can be devised for the production of fine grass, on the supposition that it gets a proper dressing to free it from root weeds, and is abundantly enriched with manure at the time ; and newly broke up land, under a proper management, is, on the contrary, much better fitted to produce healthy, firm, and luxuriant crops of corn than grass.

Summer-fallowing,—uses of it.—But as it may frequently happen that manures, for keeping the ground under crops for a length of time, cannot be obtained, it is necessary for the cultivator to try to bring these crude soils into a proper tilth for grass, as quickly as possible ; and his operations must be adapted for that end. Summer-fallow is the most obvious measure for this purpose ; and, in most cases, the operations must be commenced by that process. If the soil be very mellow, and the season favourable, perhaps it may

be possible, if the ground be broke up early in the season, to get it reduced so far in the beginning of summer, as to admit of its being sown with turnips that season ; but this will seldom be the case ; and, in general, it will be better to give it a compleat year of fallow first, and content yourself with taking a crop of turnips the second season only, by which time the field will be reduced to that husband-like state, which a good farmer ought ever to aim at.

Deep stirring of the soil, importance of.—In whichever of these ways the ground is to be managed, it ought to be an invariable rule, to make the *second* plowing as deep as the nature of the soil and other circumstances will admit. If the subsoil be retentive, and the stratum below of a good quality, especially if it be better than that which lies on the surface, (which is a very common case where heath abounds,) it ought, on this occasion, to be opened up to the depth of twelve inches at least ; and, if it be to fourteen or sixteen inches, the soil being still good, so much the better.

Trenching, its utility.—No plough, in such stiff soils, will be capable of going to such a

depth at once ; and, therefore, reliance must be had upon other aids for that purpose. Where stones are at all to be found, this operation will be best performed by a clean trenching with the spade. Where stones are wanting, and the mold moderately friable, it may be done by means of two strong ploughs, the one following the other in the same furrow. In this case, the first plough must have its mold-board so set as to make a very wide furrow ; and the plough that is to follow it, ought to have a narrower mold-board, so as to lift up the earth, loosened by its share, to the top of the other furrow. But if the bottom be stiff, and there be any obstructions, instead of the second plough, it will be more adviseable to have it done by the spade. To do this, the whole length of the furrow should be divided into equal portions, and allotted to different men, each person being obliged to have his portion cleared out by the time the plough comes round. This is not a very expensive operation ; as I have found, that from six to ten men, in proportion to the hardness of the soil, and the alertness of the operators, will be sufficient to loosen the bottom as fast as one plough can turn over the surface.

The Miner, its uses.—But where the surface soil is better than that which would come to be

turned uppermost by the trenching process, especially if that difference be considerable, it may be prudent to omit it; but never omit opening the soil to the proposed depth, if it can be done at all. In this case, it will be adviseable to make use of an implement that has been lately introduced into Lancashire, under the name of a MINER. It is a strong kind of plough, having a share only, without a mold-board for raising the earth; so that it loosens, without turning up the soil, (and to do this the more effectually, sometimes two shares, or coulter, [cutters] are added.) This implement is made to follow the plough in the same tract, so as to penetrate to a considerable depth below the bottom of the furrow. I consider this to be one of the most useful implements that has of late been introduced into the practice of agriculture, which every farmer, who has a soil capable of admitting it to work, should have.

A particular kind of wet soils, how to drain and cultivate.—I am thus particular in expressing a solicitude about this deep loosening of the mold, because I have remarked innumerable bad effects that have resulted from the general want of attention, which prevails throughout

every part of the island to this particular.—Where the mold has only been opened to the depth of a few inches above a stiff clay, or other retentive subsoil, observe the consequences!—Whenever rain falls in great quantities, a great part of it must be quickly carried off, or the soil will be drowned, and rendered unfit for the purposes of vegetation, in whatever state it may be in other respects. For this reason, every farmer is aware of the necessity of having a sufficient number of open furrows upon all retentive soils, for carrying that superfluous water as quickly and compleatly off the ground as possible.—This water flows partly along the surface, until it falls into the furrows, and it partly sinks through the mold till it reaches the open furrow; but unless it be during very heavy dashes of rain, the greatest part of the moisture sinks gradually through the pervious mold, until it meets with the impervious substratum that lies below it. When the water reaches that substratum, it forms a kind of subterranean lake, which finds no issue, until by its gravity it forces for itself a passage laterally through the crannies of the mold, till it at last reaches the open furrows prepared for that purpose, which afford it then a ready outlet, through which it can flow off the ground. In

these circumstances, it is obvious that the portion of the mold which lies immediately contiguous to the substratum, must be, for some inches in depth, more or less in proportion to the quantity of rain, and the tenacity of the soil, in a state of bog or watery quagg, that is unfit for sustaining any of those plants which it is the aim of the husbandman to cultivate in this climate. In this state, too, the mold there being so long soaked in water, and so frequently drenched by it, must have every material it contains that is soluble in water, compleatly washed out of it in a very short time, and its particles so frequently and thoroughly soaked, as to reduce it to a kind of paste, fitter to be converted into a brick on drying, than to become a friable mold. If the earth be loosened by the plough, only for a few inches depth on the surface of such soils, the whole of this pasting process must take place among the only mold in which the plants that grow upon it, can seek their nourishment ; so that this soil must be at one time in the state of a pap, that would be too thin for the mortar in a mason's tub ; and, at another time, it must be as dry, and nearly as hard, as a sun-made brick. In this condition, what sort of crops can be expected of any kind ? It is this sort of management which, for the most part, is

the cause of that kind of starved unproductiveness of soil, which is known among farmers by the name of *hide-bound*, which many men believe it would be throwing away money to attempt to reclaim. And it is certainly true that, so long as men shall continue the practice of such scratching of plowing, as that I here take notice of, they judge rightly. But under the system of management above described, many of these soils may, in time, be rendered amongst the most productive in the island, and with great profit too to the judicious operator.

When the soil is opened up by the processes recommended above, it is rendered pervious to water to the whole of the depth to which it is loosened; while at the same time, the water is allowed to find its way off the ground at a depth so far below the surface, as not to injure that portion of the mold in which the principal roots of the plants abound. Indeed, a great part of that moisture, in these circumstances, never finds its way off the ground at all; but soaking gradually downwards, that water, which, if it had only been allowed to sink three inches, must soon have reached the bottom, and there have been regorged back upon the soil, will require at least five times as long a period to sink to fifteen inches

deep, and in its progress will be only gradually moistening, instead of drenching the soil; so that if the rain shall subside before it has reached the bottom, no part of that water will be carried off the field, unless what flows over the surface; but it will there remain to moisten the earth only to a salutary degree; and, like the water in the stomach of the camel, will afford a supply when drought comes on and parches the surface of the ground: for the deep fibres of the roots penetrating downwards, there will find moisture, which those near the surface would then be deprived of. Thus does the practice recommended operate alike as a cure for the excess of wet as of drought, and produces a healthy vegetation in all circumstances. One would wonder, that seeing the effects of this process so universally in our gardens, to which these owe in a great measure their superior degree of fertility, men should so seldom have adverted to the benefits they would derive from the same process being extended to the fields. They see that in gardens, even where the soil is very retentive, good crops are produced without water furrows at all; whereas, in fields of the same nature, they know that nothing of this sort could be expected. The rationale of this phenomenon being now explained,

it will be no longer a mystery to any one ; and it is to be hoped the Board of Agriculture will pursue such measures as shall render it practicable for the agriculturist to adopt it universally, where necessary ; which it certainly is not in his power to do, throughout the greatest part of England, under the present system of management.

Deep plowing, on ordinary occasions, not necessary.—But though the benefits to be derived from the opening up of the soil to the depth proposed be very apparent, I conceive it by no means necessary to attempt to plough, on ordinary occasions, to a great depth: on the contrary, unless it be for very particular purposes, if the *miner* be from time to time employed for loosening the soil to a proper depth, I am satisfied that shallow ploughing would be, for the most part, more beneficial than the reverse. In that case, the surface-soil, in which all seeds must germinate, and draw their nourishment for a considerable period of their growth, will be rendered much more fertile by the same quantity of manure, than if it were mixed with a much greater depth of mold ; and as it is known that the fertilizing qualities of all manures are carried downward by moisture, where the soil is so porous as to admit

of a slow absorption of that water, the under-soil will gradually become more fertile by this process, which will still tend to nourish the crop. From these considerations, instead of advising the manures to be buried to a great depth, by very deep plowing, I should much rather recommend, when the trenching or mining process is connected with it, that the plowing should be of a moderate depth. Though on retentive soils, where that practice is omitted, deep plowing is doubtless extremely necessary.

Lime ought to be spread while in a dry powdery state.—In every case, the sooner the lime is laid upon the soil, after the trenching process has been compleated and the surface smoothed, and the more quickly and intimately it can be blended with the mold, the better it will be on every account. For as the lime never acts till it becomes blended with the soil, and acts the more powerfully in proportion as this mixing is the more compleat, it should be applied as early as possible, that it may have the full benefit of the subsequent plowings for blending it thoroughly. For the same reasons, the lime should always be spread while it is yet in its dry and powdery state, and should be plowed or harrowed in as

soon as possible after it is spread, to prevent it running into clots by moisture; as these become afterwards stoney masses that never can be properly divided. I take notice of this circumstance specially, because I have observed that it is a very common practice to lay down lime that has been brought home in the state of shells, in heaps to slack by the air; in which case, it seldom fails to be converted into the clotty state I here reprehend; and in which it will not produce the same effect upon the soil that half the quantity of lime, judiciously applied, would have done. To lay down the shells where water can be had for slacking them, and driving the lime to the field as soon as slacked, can usually be done at a small additional expence, which will be repaid more than an hundred fold by the superior luxuriance perhaps of even the very first crop only: so that the contrary practice is extremely uneconomical.

Turnip a proper crop for unmellowed soils.—
No crop succeeds better on harsh unmellowed soils than turnip. Perhaps it thrives better on these, with a sufficiency of manures, than on those soils that have been long under cultivation. This is therefore the best crop for the *first* on all

newly broke up wastes, that are not of too clayey a nature. It not only mellows the soil even perhaps more than a fallow, but affords a great deal of dung, which is an article of inestimable value in enterprises of this kind. It is a great mistake to suppose that turnips will grow only upon light land: they thrive exceedingly well on stiff loams. Even upon clayey soils, as good turnips can be reared as on any other, particularly the Swedish kind, called *ruta бага*; (*k*) but the difficulty of carrying them off from such soils is an objection to their culture on that kind of ground. (*l*) By consuming the turnips in the end of autumn, and early in winter, this inconvenience may be greatly diminished; and though the profit to be derived from them, at that season of the year, is less than if they could be reserved till farther on in winter, it deserves to be well considered whether this crop, with all the inconveniencies attending it, may not be more beneficial, in the particular case under consideration, than any other.

Turnips should be sown early.—In all cases of this nature, the turnips ought to be drilled, and thoroughly horse-hoed. The dung should be applied in the drills immediately before sowing.

It is unnecessary to be more particular here, in regard to the culture of this crop. I shall only barely observe, that it is of great use, in every case of this nature, to sow the turnips very early in June; as thus the crop will never fail to be much larger than if sown later. The apprehension that early sown turnips run sooner to feed in the spring, than those that were sown later, is a mere groundless chimera, that has too long disgraced our books of agriculture. If turnips do not shoot during the summer in which they are sown, (which will seldom happen, if not sown before the middle of May,) they will be just as late of shooting in the spring, as if the seeds were sown in August or September.

Two crops of turnips may be taken in succession.—Turnips are so useful an article in improving waste lands, that, in many cases, it may be adviseable to take even two crops of these in succession, from the same land, one year after the other. This will reduce it into fine tilth, and render it in excellent condition to be laid down with grass seeds, along with the first corn crop.

Pease or vetches may be sown on stiff soils.—Where turnips cannot be ventured, pease or

vetches may be adopted in their stead. This never should be attempted, except in stiff soils: and here, those kinds which run much to haulm should be preferred. The longer the lime has been applied to the ground, and the more thoroughly it has been mixed with the soil before the pease are sown, the better. The dung should be plowed in with the seed furrow. The seed may be either drilled or sown broadcast; but if there be no danger of their failing, broadcast is fully as adviseable, for, in soils of this nature, few weeds are ever to be found. Potatoes may also, in many cases, be advantageously reared as a first crop from waste lands.

Oats succeed well on crude soils.—The culmiferous crop that succeeds best on unmellowed new ground, is oats. If the ground has been sufficiently manured, this crop will seldom fail to be an abundant one, even where the culture has not been so perfect as could be wished. If the soil has been made very mellow, barley will also succeed tolerably. Rye, I have been told, does very well, and may on some occasions be adopted, where a market for it can be found; but, upon the whole, oats will, in most cases, prove the most profitable crop. It frequently

happens in England, that *wheat* is sown for the first crop, after even an imperfect fallow. No farmer can surely stand in need of directions how to manage ground that can produce a good crop of wheat under these circumstances. It is a severe reflection upon the country to say, that any land, of a quality that can afford a tolerable crop of wheat in these circumstances, should have been suffered to remain till our time under the disgraceful denomination of wastes.

Grass seeds should be sown with the first corn crop.—Along with the first corn crop where the improver of waste lands has not the conveniency of an adjoining farm to permit the newly cultivated lands being continued for some time in corn, as already specified, grass seeds should be sown, with an intention to allow the field to remain in grass till the whole portion of waste has been brought under culture. After which the skilful farmer, if he see it necessary, may go over it with a second series of dressings to make it still richer grass than before. But it is foreign to our purpose, to pursue this process farther in this place.

The kinds of grass seed I would advise to be sown in these circumstances, are white clover,

(ten pounds,) yellow clover, (ten pounds,) and clean rye grafs seeds, (two bushels per acre.) If yarrow seeds were to be bought, I should advise four or five pounds of these to be added ; diminishing, in that case, half a bushel of the rye grafs : and if it were spongy mossy land, tending to damp, six or eight pounds of rib grafs may be substituted in place of so much of the yellow clover. The poa grasses, and some others, are good ; but there is a difficulty in procuring the seeds, which I fear will not be easily overcome.

My reason for omitting red clover, is, not that it would not prosper in such soils : for in these circumstances it would thrive very well ; but because it is a shortlived plant, and soon dies out ; and as its broad leaves, where it does thrive, overshadow the other grasses, it is apt to choak them ; so that when it wears out, it leaves the soil bare of plants, which encourages weeds and useless grasses to come up in its stead : but as it is an excellent grass for foiling horses, if cut and used green during the summer, as much ground may be sown with red clover as shall be sufficient for their use, if the undertaker so incline ; but never omit a small sprinkling of rye-grass among it, which will not only augment the quantity of produce, but also bring it some weeks more early in the spring than it would have been.

Rye-grass recommended.—I am also aware of the aversion that some persons have against rye-grass: but as I am satisfied, from long experience and accurate observation, that there is no sufficient foundation for this prejudice, I should think I betrayed the trust reposed in me, did I allow it to influence me on the present occasion. Besides the recommendation of this grass, from the facility of obtaining its seeds, it has so many other valuable qualities to recommend it, that I consider every circumstance which tends to circumscribe its use as a national misfortune. It is a grass that is liked by almost every domestic animal above all others. It springs up very early in the season, furnishes a vast abundance of herbage, and thrives on almost every soil. On very poor lands, indeed, it produces a much more scanty crop than on such as are richer; and on all such occasions, if it be not eaten down very close in the beginning of the season, it is apt to run up to seed; after which the stalks, like the seed stalks of every other kind of *gramen* I know, are disrelished by cattle. Under the management of a sloven, then it may be allowed to run to waste; as the best pastures even in Romney marsh may also be, to the great detriment of the owner, if not adverted

to in time; But if it be hard enough stocked, especially *in the spring*, which is not a matter of great difficulty, it will continue to afford sweet and succulent herbage throughout the whole remaining part of the season: so that he who suffers by this neglect has only himself to blame, and not the plant he has injudiciously cultivated.

Some persons will perhaps think the quantity of seeds above recommended, more than necessary. Certainly less might do; but experience has taught me that, on an average, more profit will be derived from this abundant feeding, than the reverse.

The practice of sowing all kinds of rubbish promiscuously, under the name of *hay seeds*, is now so universally exploded, by all sensible men who have had opportunities of being fully informed, as renders it unnecessary for me to say any thing particular on that head.

Burnbeaking, cases in which it may be successfully adopted.—Where the surface of waste grounds to be improved is covered with a thick coat of the *nardus stricta*, and other dry benty kinds of grass, it will often prove beneficial to pare and burn that surface; and, therefore, in these circumstances, a good economist ought not

to overlook this mean of forwarding his operations. I am no stranger to the prejudice that prevails among many writers of the present day against this practice; but this, I conceive, in a great measure, owes its origin to hasty observation, which does not admit of discriminating fairly between the proper use and the abuse of this practice. It is an undoubted fact, confirmed by the experience of many practical farmers, that on many poor soils, a crop may be thus obtained much more abundant than could be obtained without it. This fact, and it is an important one, is admitted even by those who oppose the practice. It is well known by every practical farmer, that an abundant crop of any kind, under judicious management, is one of the most certain means of laying the foundation for future crops; and in cultivating waste grounds, it is a great point gained to obtain a good crop at the commencement of these operations.

Burning does not consume the mold, nor change the soil of waste grounds for the worse.—As to the idea, which seems to influence the opinion of many of these writers, that this practice tends to destroy the soil itself, and thus to render it thinner than it would be, it plainly originates from misconcep-

tion; and is directly contradicted by experience. No kind of earth, properly so called, [I exclude peat earth, commonly called moss, from the class of earths properly so denominated; so that it is to be here considered as an exception.] is capable of being consumed by fire. All that the fire does, in the process of *densfiring*, or *burn-beaking*, as it is indiscriminately called, is to consume the dried vegetable fibres which were intermixed among the soil; during which process a small proportion of alkaline salt is generated, which is known to act very powerfully as a manure; and the earth that was entangled among these roots, in consequence of the incineration, is dried, and reduced to a powdery state, but neither is destroyed nor reduced in quantity. The qualities of this earth may, indeed, by this process, be sometimes a little altered; but, in the circumstances here stated that alteration, it should seem, could seldom be for the worse. The kind of earth that is the most altered by the action of fire, is clay. Instead of remaining susceptible of being very much softened by water, clay, by this process, is rendered incapable of being thus acted upon. A small proportion of powdery brick earth thus obtained, mixed with the retentive mold, has apparently a beneficial tendency to divide it, and render the

soil more mellow. These and other considerations, make me lean to the side of experience, in this case, with less difficulty than I otherwise might have done; and I should have no hesitation in recommending the practice as beneficial, in the circumstances above specified.

The surface only may be burned, though the soil be deep ploughed.—The greatest objection to it, in this case, is the difficulty of stirring the mold to a sufficient depth before the incineration is effected; for experience universally confirms the propriety of giving only a very slight plowing after that process, before the seeds are sown. To effect both these purposes at once, a skim plough might be easily contrived, which should pare off the surface where the ground was free of stones, to a moderate thickness, and, by having a horizontal ledge projecting beyond the bottom of a part of the mold-board, thus carry the thin swardy surface over the *open* furrow to the right hand side, and lay it on the top of the earth that had been turned over beyond it, as shall just now be described. After the surface has been thus pared off and disposed of, another plough should follow in the same tract, and turn the bottom earth over into the open furrow, on the right-

hand side, as in common plowing; and this may be deepened by the spade, or otherwise, to any degree thought necessary, without burying the sward in the smallest degree. By this mode of management, the sward may be dried and burnt perfectly well, and the earth be properly loosened at the same time. If that sward be properly burned and spread in due time, and if lime be mixed with it, and slightly plowed in for turnips, an abundant crop will thus be obtained the first year, without any dung. This good crop of turnips will afford a great quantity of dung, while the soil will, in the mean time, be more mellowed than if it had been left under a bare summer-fallow. If the same field be next year dunged and sown with turnips, it will afford a still more abundant crop; and the soil will by this time be reduced into the most excellent tilth for being laid into grass with the succeeding corn-crop; after which it must be the farmer's fault, if ever in future it can be put out of order. It is not, however, my province here to proceed farther in the mode of management of such land.

Burning old corn land may prove hurtful.—
 But although I consider the practice of burning the surface of barren *waste* soils, which are not of

a mossy nature, wherever the plants on the surface are abundant, as exceedingly beneficial, I confess I have my doubts about the propriety of extending this practice to such soils as have been already fertilized by manures, and brought into proper tilth. All kinds of earth, though they be in their original state, when dug from a great depth, infertile, become more fertile by degrees, on being exposed to the air on the surface, when impregnated by manures, and the gradual rotting of the roots of plants that grow upon them, along with the intermixture of the remains of animals which die there. They are thus in time converted into that kind of substance which we call *vegetable mold*. This vegetable mold, then, is neither a simple earth, nor a mixture of any number of simple earths together. But it is such a mixture, impregnated with the remains of animal and vegetable matters united with them. These remains of organized bodies communicate something to the soil of an apparently oily or mucilaginous nature. Along with the fertility which it is seen to acquire, these give it a more friable texture, and a greater facility than it originally possessed, of absorbing water in a proper manner, and retaining it to a certain degree. Now, there seems to be little reason to doubt that fire tends to alter, destroy, or

dissipate this mucilaginous quality which the mold derives from the spontaneous corruption of organised bodies. So that wherever the soil has been gradually fertilized by this process, there seems reason to fear that the burning of its sward will rather prove hurtful than beneficial.

But while I thus develope, as clearly as I can, the reasons that would make me doubt of the propriety of the practice of burning, in these circumstances, it is proper the reader should be at the same time warned that these are only reasons for doubting, but by no means rules for practice. Practical rules should on all occasions be deduced from well authenticated facts alone ; and I have had no opportunity of meeting with any facts I could rely upon, that either tend to confirm or to refute this mode of reasoning. I give it, therefore, as merely hypothetical, and as serving to direct the attention to a proper object of experimental enquiry, and nothing more. Human reason is by far too fallacious a guide to be relied upon in matters of this kind, as a *practical director* ; though it is an excellent assistant for leading the mind into a proper train of investigation.

Burning mossy soils, a dangerous practice.—
I do not speak with the same reserve in regard

to the impropriety of burning *mossy* soils ; of the very hurtful tendency of which I have had innumerable practical proofs. In this case, it is not the plants which grow upon it, but the very substance itself that served as a soil on which the plants grew, that is totally destroyed by incineration. This substance is, by burn-beaking, amazingly diminished in quantity ; and the little that remains, instead of soil, after this destructive process, is an inert earth, which is more unfit for the purposes of vegetation than any other that has ever fallen under my observation. I therefore consider the burning of this kind of soil, as in all cases pernicious ; but particularly so, where there is no certain means of easily stopping the combustion, after a thin paring of the surface-sward has been consumed ; and to stop it just there is, I know, a thing that is next to impracticable. For the proper means of meliorating peat, and converting it into fertile soil, I beg leave to refer the reader to a practical treatise on peat moss lately published by me ; as it would take up too much room to recapitulate the whole process in this place. It is only necessary here to observe, that of all the kinds of barren wastes, the improvement of this variety, under a judicious system of

management, can be effected with perhaps less difficulty than that of any other.

Stiff clayey soils difficult to be brought into cultivation.—The most hopeless soil for an unlucky adventurer to begin to work upon, while it is yet in a rude and unproductive state, is that of a stiff, coherent, obdurate clay. This kind of soil, though it be physically capable of being rendered perhaps the most productive of any that can be found; requires, when in a poor state, such nicety of management, such repeated additions of manures in vast quantities, and such an enormous expence in the cultivation of it, as to make any man of sound sense hesitate about engaging in attempting to improve it at all, unless under very particular circumstances. When circumstances, however, are favourable, it may be sometimes done under the care of a very skilful operator, with great advantage.

The expence of cultivating such soils often proves ruinous.—In every possible combination of circumstances, where a *whole farm* consists of this kind of soil, it must be managed at a vast expence. On account of the stiffness of the soil, the implements of agriculture must be strong and

weighty, and, of course, the strength required to draw them must be great. But this is not the worst evil. On account of the necessity of catching the most favourable *tid* (*m*) for labouring the soil, or of losing the whole crop, the time of plowing is limited to a very few weeks only; so that to perform the same quantity of work upon this kind of soil *in a proper manner*, will require more than *ten* times the number of servants and beasts of labour, that would be wanted on a farm of equal extent, consisting of light friable mold: so that if the operator has not some other way of employing his force in the intervals, they must be idle; which will soon eat up the profits that can be derived from the most abundant crops. To diminish this expence, the unfortunate operator sometimes finds himself tempted to try to labour his ground when it is *not* in the most proper circumstances as to *tid*, which infallibly diminishes his crop to an astonishing degree. In this way, I have known several unlucky persons reduced to bankruptcy, in farming soils, that undistinguishing observers would call soils of the best quality; because they would sometimes see upon them the most weighty crops they had ever observed. These people do not advert, that though a guinea be a very good thing, the man who is obliged to

pay two and twenty shillings for every one of them that he obtains, will very soon be reduced to the necessity of purchasing no more of them.

If a little of that kind of stiff land can be joined as an appendage to a farm of considerable extent of light friable mold, it may become a valuable addition to it; because the operator will thus have employment for his servants and beasts at all times, and when the proper *tid* arrives for labouring his stiff lands, he can turn his whole force upon it, so as to labour it just in the nick of time that is necessary to insure a superabundant crop. Under these circumstances, such land, in the hands of a skilful farmer, becomes a treasure of great value: but it is only under circumstances similar to this, that the full benefit can ever be derived from such a soil. More need not here be said on the subject of improving lands of this description by means of tillage.

§ II.

PART SECOND.

On the cultivation of waste lands, as not connected with a farm.

ALL that has been said above respects the improvement of waste lands when they are connected with an adjoining farm, or in other circumstances where animal dung can be brought upon them from without. If no recourse can be had but to the waste land itself for animal manures, its improvement becomes much more difficult; and other measures for accomplishing it must be adopted.

Temporary measures necessary to be adopted at the beginning of such operations.—If a man were to form a deliberate plan of setting himself down upon an extensive unproductive waste, with a view to cultivate it, he would find himself under very uncomfortable circumstances for some time at the first, whatever were the amount of his

funds. Houses must be, in the first place, erected, and some of the land must be cultivated; but where is he to find food for sustaining the beasts that are necessary for these operations, before his crops come in to furnish that food? This is a very serious consideration to which he must advert, and which must be obviated before he begins his operations, otherwise he will be subjected to great difficulties, besides accumulated expences and losses, that may prove ruinous. In general, he will find it safest for him, and cheapest, to prevail upon some of the nearest farmers to perform some of these necessary initiatory operations for hire, on such terms as he can engage them; and keep as few beasts of labour of his own as possible, until he get some crop to sustain them. In this case he must content himself at first with doing not what he could wish, but what he can do; so that he may be obliged to take a crop or two, perhaps, without dunging, after liming only: but from this mode of procedure he should desist the moment he can find abundant subsistence for his working beasts; and begin as soon as possible to put his fields into substantial good order, by dunging those fields that have been limed, and laying them into grass. Whenever he has got abundance of food for his working beasts, his greatest

difficulty is overcome; and provided his purse holds out, he may then go on without much difficulty, by adhering to the following plan of procedure.

The natural produce of waste lands consumed by sheep.—There are very few soils so barren but they afford some herbage upon which animals of one sort or other may be sustained. Sheep are the stock that are best fitted for the most barren soils; and the rearing of sheep in general, is the use to which such soils are applied in their natural state. A farm of such bare pasture to be capable of sustaining a flock of sheep so large as to pay for the expence of a skilful shepherd to attend them, without which no sheep can ever thrive, must be of very considerable extent. But whatever be its extent, if the dung of these creatures be properly collected, and judiciously applied, along with lime, aided by a skilful culture and good management, it will furnish the means of gradually meliorating the soil, and rendering it more productive of grass as well as corn, than it ever could have been under the slovenly system of management, which the bars to improvement already enumerated have rendered almost universal.

A slovenly practice being once introduced, it is found that inaccurate ideas come to be spontaneously engrafted upon it. All mankind know that if animal dung be laid upon any soil in sufficient quantities, and properly worked into it, the soil will be rendered much more productive than it would have been without it: and if, when it is once brought into that productive state, it be then laid into grass, that patch will continue for an indefinite number of years, much more fertile than the adjacent ground of the very same quality, that has not been dunged.

From this fact, which every person in the country has had an opportunity of observing, [The little gardens made by industrious cottagers, which are to be seen in many places, on very unproductive wastes, afford the most satisfactory examples of the fact here stated.] a necessary consequence is, that every soil on which animals of any kind are sustained, must either be in a continual state of progressive melioration, or the effects of the dung of the animals must be lost through some unobserved kind of mismanagement.

The dung of these sheep a source of improvement.—To render this proposition palpable, suppose a sheep-farm that is capable of supporting

one thousand sheep. It has been ascertained by repeated experience, that if the dung of that thousand sheep be carefully collected into one mass, it will be sufficient to manure one acre each day in a very proper manner (*n*): nor do I suppose any farmer will not be ready to admit, that, if the dung thus produced were properly mixed with the soil, and the field then immediately laid down into grass, without being exhausted by corn crops, the grass upon such dunged fields would be so much augmented in quantity, as to be on an average, upon such poor soils, capable of sustaining one sheep at least per acre, more than it could have done without that dunging.

If this be admitted, it will follow, that as the thousand sheep would afford dung for 365 acres in a year, the melioration of the soil in the course of one year, should be equal to the feed of 365 sheep. So that in the second year, it should, instead of 1000 sheep, be capable of supporting 1365; and, in the third year, an addition of more than 365 might be made to that; and so on, in a progression approaching to a geometrical *ratio*.

That no such melioration as this takes place in practice, is very obvious: on the contrary, it is well known that many wastes can sustain no

more beasts at present, than they could have done perhaps a thousand years ago. Hence it follows, that the dung which has been dropped from these animals during the whole of that period, has been dissipated and lost; which, if it had been judiciously managed, might have been the means of a great amelioration during that time.

I do not pretend to say that it is practicable for any man to collect *all* the dung of the sheep pastured under any circumstances, so as to apply it in the manner above described, to the immediate amelioration of the soil in the direct manner above specified; and, therefore, am not so chimerical as to insinuate, that an amelioration to the above degree, though physically possible, is morally practicable in any case. Under every system of management, some waste must be unavoidably incurred, because some part of the dung must be casually dropped. All I wish to inculcate is, that wherever dung is allowed to be dropped at random on the fields, under the circumstances specified, it either tends not at all to meliorate the soil, or to do it in such a slight degree as not to be in the least perceptible: [See the following Essay on the æconomical consumption of the products of a farm.] Of course it fol-

lows, that the less dung that is suffered to be wasted in this way, the better it must be for the general improvement of the country, and the welfare of the community at large; and that, of course the neglect of this necessary attention is highly uneconomical; though it has been so little adverted to, that I make no doubt but nine out of ten who shall read this, will feel themselves disposed to deny the conclusion I draw, though they can neither produce a fact, nor a solid argument to invalidate it. I write, however, for the information of those who shall have the patience to lend an unprejudiced and attentive ear, and not with a view to obtain the approbation of the inattentive.

The folding of sheep has been practised for many ages, and still is practised in many parts of Britain with much benefit to the owners of flocks, though it has not been any where that I know of attended to, with a view to the steady and progressive amelioration of waste grounds; for the affecting of which the following directions may be found of some utility.

Lime should be conjoined with it.—I scruple not again to repeat it, for it cannot be too strongly inculcated, that lime, or other calcareous mat-

ter, applied in large quantities, must form the basis of all radical improvements on waste lands. Lime tends to sweeten the grasses produced on every soil to which it has been applied, so as to render them more palatable to all animals; it augments the quantum of the produce considerably; it thus renders the ground capable of sustaining a greater number of beasts. These, of course, produce more dung; and that dung, if applied in conjunction with the lime, will produce greater and more lasting effects than it could have done without it. It would seem that Heaven, with a view to reward the industry of man, and to set no limits to the possible melioration of the soil, had dispersed this universal fertilizer so generally over our globe, as to bring it within our reach, by the exertions of human industry, almost every where. Whatever, therefore, tends to facilitate the acquisition of this manure to any particular place; whether by means of roads, canals, or any other device, must be considered as amongst the most useful of human exertions. Supposing it to be thus attainable, our business here is to show in what manner it can be the most economically applied for the purpose of improving waste grounds.

Folding of sheep, mode of conducting it.—Where it is proposed to apply the dung of the animals which pasture upon waste lands for the purpose of gradual amelioration, recourse must be had to the fold ; and lime should in every possible case be adopted in aid of it. Dung, as well as lime, will always produce the best and quickest returns, when it is connected with tillage ; therefore, as much of the ground should be fallowed as circumstances will admit, and limed as described in the preceding part of this chapter. Upon these fallows the sheep should be folded, by means of hurdles, during dry weather ; and these hurdles should be so moved, as to admit of the ground being plowed over as soon after the folding as possible. The mold having been previously deepened by the means before described, and the lime applied, it should be turned over by a very ebb [shallow] furrow (*o*). If the soil be proper for turnips, as much of it as has been dunged before the middle of May, should be again plowed over, and instantly sown with turnips the very day it is plowed, as shortly after plowing as possible : for no state of the soil is, in any case, so favourable for the germination of seeds in this country, as that kindly moisture which is always found in new plowed grounds, when in good

tilth. This mode of sowing should be universal; as it will more effectually insure a crop from missing, than waiting for rain, which frequently bursts the seeds, and consequently loses the crop.

From the middle of May till the middle of August, the turnips should be sown progressively as the ground is dunged, always plowing and sowing it as soon after dunging as possible.— After the middle of August, it will be unnecessary to sow any more turnips that season. But if the soil be good, and the dunging abundant, rye, or cole-seed for spring food, or winter tares to succeed them, may be sown till the month of October; after which time, it will seldom be practicable to fold on the fallows.

The turnips, if fed off with sheep, will afford the ground another dunging; and it will then, in general, be so rich as to admit of its being laid down with grass seeds, as above directed, along with the first crop; from which, if it be wanted, one crop of hay may be cut, and then it may be cut and consumed green in the house, or pastured. Thus will a considerable addition be made to the food of animals upon the farm, and with it an increase of dung, which, if managed in the same economical manner, will augment the quantity of land that can be annually

improved, and thus accelerate the progress of the improvement, till in time the whole must be compleatly gone over in this manner, and rendered in every part much more productive than before. After this, by beginning the same process afresh, in which the addition of lime is not so necessary, the land will be endowed with a yet higher degree of fertility. And thus it may be gone over successively, a second, a third, or a twentieth time, still advancing in its degree of fertility, till it has become as rich as can be desired.

I make no attempt to estimate the quantity of ground that may be thus improved in a given time, or the rapidity with which the progress may be accelerated ; because, in a case of this kind, it is obvious that the facts on which these calculations would be grounded, must be assumed at the pleasure of the writer. It is thus the easiest thing imaginable to make the result be precisely such as he would wish it should be : so that, without his intending it, every such calculation may prove fallacious, and tend greatly to mislead the incautious reader. Besides, it is obvious that no calculation could be made, the result of which, as to the *quantum*, could be relied upon ; because no two cases could be found, un-

der which, by the same mode of management, the result would be the same as to the *quantum* ; for this must depend upon the nature of the soil, and many other indefinite circumstances. All I aim at, by this illustration, is to show that, under the system of management here recommended, there must be a continued progressive amelioration in *every case* ; though the rapidity of that progression, and the proportional expence at which it can be effected, will greatly vary, according to the circumstances of the case.

Neither do I enter into a minute detail of the particulars that would be necessary to be adverted to under this system of management, as my object here is only to illustrate the general principle. Every intelligent farmer, who attends to it, will see that many economical precautions must be adopted, to enable him to derive the full benefit from the dung of his sheep, without hurting the animals themselves. He will see, that if his grounds be of large extent, it will be convenient for him to have at least two folds under the fallow system ; one towards one end of his grounds, and the other towards the other. Perhaps it may be necessary to have more folds than two ; as his sheep should never be obliged to travel farther to the fold than it would be necessary

for them to travel at any rate to fill their bellies ; and when they have filled their bellies, he knows they must lie down to rest themselves, and chew the cud : and this they will do with less disturbance in a fold, at regular periods, than in any other circumstance. He will also perceive the necessity of having folds provided for them in convenient places, upon dry grass ground, into which they can be put in rainy weather, when it would hurt his sheep to go upon the fallows.— All these, and many other economical considerations, the attentive farmer would necessarily discover of himself, and advert to.

I may however observe, that under this system of management, sheep would be much less harassed than they are according to the practice adopted in almost every folding county.— Because, when they are folded on the fallows of arable farms, they are always carried off their pastures ; and sometimes they must be driven to a considerable distance through narrow lanes, and bad roads, which must tend to harass and exhaust them considerably. None of these evils could be experienced under the system above recommended ; for the folds would gradually advance from the edges towards the middle of the fields, the pastures of which would surround them on every

sider. In these circumstances, under the direction of a careful shepherd, sheep could perhaps be made to thrive as well, perhaps better, than under any other system of management.

Permanent inclosures not here necessary.—

The reader will also please to advert, that, under the system of management recommended, no permanent inclosures are necessary; and therefore the total expence of that supposed improvement will be saved to the undertaker. Inclosures, where large flocks of sheep are to be kept, are well known to be not only not necessary, but highly pernicious. Sheep delight in a free open exposure, and a wide range of pasture. Whatever circumscribes them in these respects is hurtful to the animal. All that could be wanted on such lands, would be a ring of moveable hurdles round the fields that are under crop, which could be shifted annually as the improvements went forwards; leaving the grounds, both behind and before, open as at first. Indeed, inclosures are, in many other cases, rather hurtful than the reverse: and such fences as we often see around fields can have no beneficial tendency whatever. They seem only calculated for the purpose of wasting ground, and sacrificing mo-

ney at the shrine of vanity. I question not, but the money that has been expended on useless inclosures in England, in the original making them and their future support, might, if fairly accumulated, be more than sufficient to pay off the national debt: and it would be no difficult matter to find many fields, where that expence, if it were all fairly to be counted, would be more than the fee-simple of the fields inclosed would amount to.

Divided commons often come under this class of wastes.—The reader will please also to advert, that many of those commons which have been of late divided, are precisely in the circumstances that admit of being improved, with economy, by no other mode except that which has been above described; but in consequence of each of the proprietors being obliged to *inclose* his own share, it has become totally impracticable *thus* to do it; and as the expence of inclosing comes to be a considerable item, many of the undertakers become tired of the outlay as soon as that has been effected, and then leave the fields totally neglected; or, if they attempt to plough them up, having no resource for obtaining animal manure, they are forced to lay them out to grass

in that shabby state of poverty, which is the cause of loss to the undertaker, and no advantage to the public.

On the whole, the cultivation of waste lands, where the original soil is of a tolerable quality, though it be at all times a nice operation, and in general attended with considerable difficulties, especially at the beginning, may, for the most part, be accomplished with profit to the undertaker, and much benefit to the community, wherever the operator is allowed to reap the *full* profits to be derived from his industry; but where he is certain that he *can* not, or suspects that he *will* not, be allowed to do this, the very thoughts of attempting it are repressed in his bosom; and an indolence in this respect, which at first sight appears to be culpable, but which upon a thorough examination will be found highly rational, is the consequence of it. If the effect is expected to cease, the cause must be removed. In all that I have written above, I have endeavoured to inculcate the utility of that kind of cherishing agriculture which aims at nothing short of the highest degree of productiveness; being conscious, from a long and extensive experience, that where physical obstructions are the only things that are to be surmounted, it is by this practice

alone, that profit in agriculture is to be expected. In these circumstances, a judicious man will never hesitate at incurring any expence that he knows will add so much to the productiveness of his fields as barely to repay that expence; but where another person is permitted to come and snatch away his profits, the case is much altered: he then hesitates to lay out one shilling to augment his produce; and not his waste grounds alone are suffered to continue in the state of wastes, but even his cultivated lands, and other inclosures, are suffered to remain for ages in a state of unproductiveness that might be easily removed; and which is therefore highly disgusting to the spirited cultivator to see, and disgraceful to those who, having it in their power, do not exert themselves to remove.

Lime applied to the surface, how to be managed.—I have not given any directions for meliorating ground by means of lime applied to the surface only, without being mixed with the soil; because, although I know that lime, or other calcareous matters, applied to the surface of the soil, in *very large quantities*, will have a sensible effect in sweetening the pile, and augmenting the quantity of produce also; yet, I likewise

know, that the effect of that manure would be so much greater, if mixed with the soil, that it is in very particular situations alone, that it can ever be an economical practice to apply lime on the surface only ; and never, I apprehend, where the soil is of a retentive nature. Where I wished to improve fields that were too steep for admitting the plough, I should advise that the ground, in all cases, where it was in the least of a retentive nature, should be trenched by the spade, before the lime was applied, and then to blend it with the surface-mold. As this operation has to be performed only once, and will not only have a tendency to make the lime produce a more immediate and stronger effect upon the soil, but will also render it, in all future periods, drier in wet weather, and consequently sweeter in the pile ; and moister in dry weather, and consequently less variable in its produce than it otherwise would have been, there can be no doubt but the expence of trenching will, in a short time, be abundantly repaid.

But where the soil is not retentive, and stones are very abundant, there is not an equal necessity for digging it up ; and in these circumstances lime may be sometimes applied on grass with profit. But, in this case, it will always be ad-

useable, first to mix the lime with some good mold, if it can be got, in the proportions of nearly two parts of earth for one of lime, and incorporate them well together by frequent turnings, during the course of several months: for, in this way, it is found that lime, applied on the sward, operates much more powerfully thus than it ever does when applied by itself.

Irrigations slightly noticed.—Neither have I said any thing about the practice of irrigation; because it is only in few situations that water in abundance for that purpose can be commanded. But wherever that can be obtained, it is the surest, and the easiest of all modes of improving waste grounds. The greatest difficulty that will occur in the management of this manure, (for so I will call it,) on such soils, is the frequent inequalities that are found upon their surface, so as to prevent the water from being spread evenly over them, or the over-retentiveness of the soil. Where these two obstructions are not very great, water, if thrown over the surface in a proper manner, and managed with judgment and discretion, will soon bring the most barren waste into a state of great productiveness, either for grass or corn; and nothing can be better adapted for

an alternation of management from the one to the other: nor is there any situation in which water may not be made to operate as a great improvement, from the flattest mead to the steepest hill, if the land can be so laid out as to admit of carrying the water thoroughly off from the ground, as soon as circumstances indicate the necessity of so doing. But this circumstance is so very necessary, that in regard to this manure, as well as many others, the full benefit, in many cases, especially on retentive soils, cannot be obtained till after the mold shall have been loosened to a sufficient depth. After that has been done, and the surface smoothed, and a good sward of grass obtained upon it, the benefits to be derived from the proper use of water will be inconceivably great.

Inclosures, circumstances that render them unnecessary.—Neither have I taken inclosures under consideration; as I do not consider these to be a *necessary* part of the expence of improving waste grounds; but rather I conceive that the predilection in favour of this supposed improvement is, on many occasions, the cause of a great and uneconomical expenditure of valuable funds, which might be more beneficially applied. If

ground be to be kept under tillage, inclosures are, perhaps, in all cases, (farther than a ring-fence, especially along way sides, or where they operate as drains,) pernicious rather than beneficial. It farther appears, from what has been said above, that while land is under grasses, if the produce be scanty, inclosures are always pernicious; and it will be shown, in the following essay on the economical consumption of the produce of a farm, that they are never beneficial where the produce is abundant: so that they become of apparent utility only when land is left in grass, while in a middling state of productiveness only. And this is precisely the state in which grass land is the least beneficial to the state: so that every effort should be made to induce farmers to avoid leaving their ground in grass, while it is in this shabby condition.

PART SECOND.

*On the improvement of waste and barren lands,
by planting trees.*

THOUGH there are few fields which might not admit of being brought into culture, under particular circumstances, there are innumerable tracts of vast extent in this kingdom, which it will be much more profitable to the owner to plant with trees, than to attempt any other mode of improvement. Wherever the soil is dry and infertile ; or where its chief or only produce is heath ; or where it is full of rocks and stones rising to the surface ; or, if it be a stiff obdurate clay, having little surface-produce ; and, in general, in most cases where the soil is poor, if not in the very near vicinity of a town, it may be converted into plantations, if it can be freed from hurtful water, with greater profit than any other improvement it could admit of, unless in very particular circumstances ; even where it may admit of being brought, *in time*, into cultivable ground. Where the surface-produce is naturally small, perhaps

nothing could be so economical as, *in the mean while*, to fill it with trees; because these, if judiciously chosen, not only yield a greater profit than could be drawn from any other kind of produce, and afford conveniences for houses, and other accommodations for inhabitants and for manufactures; but the ground itself, while the trees continue to grow upon it, undergoes, for the most part, a gradual amelioration, which it would not have done in its natural state; and admits of being more easily improved when the proprietor can find leisure to overtake it, than it otherwise would have been.

§ I.

General remarks on the different kinds of trees that may be planted on wastes.

THE kinds of trees that chiefly require our notice on the present occasion, are the oak, ash, elm, beech, birch, chestnut, scotch fir, spruce ditto, stone-pine, larch, and bermudian cedar. There are many others of lesser note, that may claim our attention on particular occasions.

Of these trees, the oak is best calculated to thrive on the strongest and deepest clays. The ash loves a rich and mellow loam; and where that is the case, it prospers best on rocky banks. The wych-elm prefers also a mellow soil, and situations moderately damp, to such as are drier and more arid. The beech thrives remarkably well on dry gravels, and can bear a pretty exposed situation. The birch loves dry mellow soils, and will prosper well on land that is very sterile. The chestnut delights in deep loam, on a stone shivery bottom, where the roots run no risk of reaching a retentive clay, or other stratum that detains the water. Scotch fir, and spruce, will grow well on a light moory earth, if dry, though ever so poor, if cold clay does not rise near to the surface, or gravel, or sand. Of the stone-pine, and bermudian cedar, I have had no experience, and therefore can say nothing. But of all the trees that have been named, the larch prospers on the greatest variety of soils. I have scarcely seen it fail on any soil where water was not permitted to stagnate upon it; but it seems to prefer a mellow loam to either of the extremes of clay or sand. And as this tree is undoubtedly the most useful of the coniferous tribe, as well as the quickest grower, and the most ornamental of that class,

it deserves, above all others, the particular attention of the rural improver.

Most of the trees above enumerated, though they will thrive in plantations when properly made, upon soils of the nature indicated above, require so much care and attention while young, and such a perfect kind of culture until they are fully established, as but little suits the circumstances of owners of waste lands in general. Hence arises the universal complaint of the rapid decrease of live oak in this kingdom; a circumstance which, though it has been noticed and complained of for a century past, has not admitted of any alleviation; nor seems likely to do so in the present state of things in this country. Much might be said on this subject, under the idea of patriotic exertions; seeing it is admitted on all hands, that when the british oak shall fail, our navy must sustain an irreparable diminution in point of strength and durability: but as nothing that I could say could prove of any avail to incite to enterprizes which so many other circumstances tend to counteract, I think it unnecessary to enter upon that subject; more especially when I consider that it does not so properly fall under notice on the present occasion, as the planting of such trees as can, with great economy, be reared in

large plantations at a small expence, upon heathy moors and other barren wastes, so as to return an abundant profit to the undertaker in the course of a very moderate period of years.

§ II.

Of fir plantations in particular.

THE improvements that have been made in the northern parts of Scotland, by means of large plantations of scotch fir, upon the barest moors, and in the bleakest and most inhospitable situations, are now well known; and afford the clearest demonstration of the utility of such enterprises, when judiciously conducted: and though it is admitted that the scotch fir is among the most perishable, and the least valuable kinds of wood that can be reared, and therefore sells every where at a very moderate price; yet as the expence of rearing that tree is very trifling, the returns have been in all cases so abundant, as fully to satisfy the persons who have made these plantations; even when no other circumstances, but the direct income that has arisen from these plantations themselves, has been taken into the account.

But when the collateral advantages are likewise adverted to, the improvement occasioned by these appears to be infinitely great. In the neighbourhood of such plantations, houses can be reared at so little expence, and the roofs are so much straighter and better than ordinary, as to induce settlers to make their houses much neater and more commodious than in other places; rails, and other kinds of dead fences, can be so easily obtained, that poor people are first enabled to have good well fenced gardens, and then commodious inclosures of larger extent; the branches afford fuel to the settlers, which greatly adds to the comforts of their situation; cutting and manufacturing the wood into various kinds of utensils, furnishes employment to many persons; population is thereby augmented; and, with an increase of population, its necessary consequence follows, a desire for land to produce the necessaries of life, and a consequent encrease of rent to the proprietor. Like the settlers in America, these new settlers, in the desert wastes of Scotland, cultivate and improve the soil, as the trees are gradually cleared from it. In this way, Mr. George Dempster, who will long be respected in Britain, at this moment sees fields rapidly converting into cultivated ground on his estate, and

yielding to him ten or twelve shillings *per acre* rent, not only without any expence to him, but after having derived a considerable profit from the sale of woods of his own planting, which grew upon land that five and twenty years ago was not worth, to him, above two pence *per acre*, and which might have remained in that state perhaps for ages yet to come, had it not been planted at all. It is by a judicious management of this kind that men of landed estates, by a little foresight, and with much profit, find themselves enabled to furnish both employment and subsistence to a numerous people, who must otherwise have either remained in a destitute situation, or have abandoned a country which did not properly provide for their accomodation. This is the kind of charity I wish to promote. It is an inexhaustible fund, which enriches the giver, and ennobles and adds energy of body and mind to the receiver, instead of debasing it, as the receiving of *alms* in any situation necessarily must do. One would think, that the prospect of being thus extensively useful to mankind, while the interest of one's own family would be so essentially promoted, would prove an irresistible stimulus to every person to enter upon similar enterprises with spirit and alacrity. In Scotland, this spirit is pretty gene-

rally excited; and the benefits that result from it are every day becoming more and more apparent. In England, the hands of industry are, *in this respect also*, tied up. Injudicious fiscal regulations continually oppose every attempt at agricultural improvement; and while our rulers, with the inconsistency of children, talk of giving premiums with one hand for the encouragement of agriculture, they with the other restrain, by an irresistible curb, all attempts at exposing to the eyes of the public those impolitic bars, which have hitherto diminished the productiveness of this island to an astonishing degree; and must continue to diminish it so long as these bars shall be allowed to remain, were premiums to the amount of the whole revenue of Britain to be given for encouraging them. To describe the improvements that *might* be made, is, in these circumstances, a very ungracious task; for no one takes pleasure in representing things as *practicable*, which he knows are not likely to be carried into practice. While a sense of duty induces me to state, with unbiassed candour, the ease with which improvements *might* be made, where *physical* obstructions alone are to be surmounted, I find it necessary, at the same time, not to disguise the less obvious, though more powerful obstructions, arising from

moral causes, that *must* be overcome, before extensive improvements of the nature I have already mentioned, or those I am now about to recommend, can ever be carried into effect.

Price at which a plantation of firs can be made in Scotland.—A plantation of scotch fir can be made at much less expence than any other kind of tree in the northern parts of Scotland; because the young plants can be afforded at a smaller price than any others. In Aberdeenshire, where planting is so general as to have become a sort of occupation, fir plants of two years old, (and above that age no experienced planter will ever buy them,) sometimes sell at the very low rate of four-pence *per* 1000, consisting of 12 hundred; and they seldom exceed eight-pence; on an average, six-pence, or one half-penny *per* hundred: and there are men who make a business of making plantations, who will undertake to compleat the whole inclosing and planting, at the distance of one yard from each other, and uphold them for five years, (that is, supply any deficiencies that may be observed,) at the rate of from ten to thirty shillings *per* scotch acre, [four scotch are equal to five english acres nearly,] according to the size of the inclosure, and the nature of the fence. In

all cases of this kind, it is supposed the plantations are of 30 or 40 acres, or upwards: for where the inclosures are smaller, the expence of inclosing is proportionally augmented. The charge is thus not only made moderate, but the total expence a man is to incur can be ascertained before he begins, which prevents him from being involved in unforeseen difficulties.

On bleak exposures, which kinds thrive best.—

It is found by experience, that there is scarcely any soil so bad, or any exposure so bleak, where the fir tree will not live, if the plantation be of sufficient extent, and not upon the very summit of high peaked hills. They do not, indeed, bear the sea-air very well, where they are much exposed to the severity of its blasts; nor is the wood ever of a good quality, or the tree long lived, upon clayey soils. Several persons in the south of England have found that the pine-aster bears the sea blast much better than any others of the fir tribe; which is a discovery of great importance, and will no doubt be attended to by improvers. The spruce-fir, however, will bear a still more exposed situation than the scotch fir; and, after a few years from the time of planting, it shoots up with still greater luxuriance. But the cones

not being to be had in equal abundance, and the plants being more difficult to rear, they are sold at a much higher price, usually about six shillings *per* thousand, fit for planting out. Silver fir, in a good soil, prospers well, and is a beautiful tree, on account of the depth of its shade; but the price of the plants is too great to admit of large plantations of them being made.

Firs ought to be planted out while very young.
 —Wherever the situation is bleak, and much exposed to strong blasts of wind, the plantation must not only be of considerable extent, if you expect the trees to thrive, but the trees must be planted very close together, so that each plant stands at the distance of from two to three feet at most from each other; the more exposed the situation the closer they must be; for it is observed, that until the branches intermingle, and thus serve to give a mutual support to each other, the trees never begin to advance with vigour. Where the plantations are thus thick, there is a necessity for beginning to thin these out at a pretty early period; so that after the tenth to the fifteenth year from the time of planting, men must be constantly employed in thinning these plantations; and there are very few situations indeed, in which these

thinnings will not sell for such a price as to do much more than pay for the expence of cutting them out: but where the plantations are extensive, these thinnings sell at a small price; which affords the conveniencies to settlers in that neighbourhood I formerly remarked, and gives employment to a multitude of persons to dress and carry them to more distant markets.

The leaves and branches of the fir-tree a wholesome food for cattle and sheep.—One advantage attending the culture of the fir-tree, is, that it has been found by some well-authenticated experiments, that the leaves and young branches of the scotch fir afford a very wholesome nourishment to cattle and to sheep; so that they may be applied, in cases of necessity, to the sustaining of those useful animals. In hilly countries, that are stocked with either sheep or cattle, the benefits that may be derived occasionally from them in this northern climate, where snow sometimes lies for many weeks together, so as to prevent the beasts from having access to other food, will be very great; and therefore no person should be without a plantation of firs on every farm for this very purpose, were it to be of no other use whatever. It may happen that, for many years toge-

ther, there may be no necessity of having recourse to this aid; in which case the trees may be permitted to grow without molestation. When this supply must be resorted to, it is only necessary to cut down some of the branches with leaves upon them every day, and give them to the beasts, fresh and fresh as they are wanted; on which food the creatures may be preserved in perfect health for months together, should it be necessary. The larger branches left by them being piled up in a heap to dry, become excellent firewood; and the trees prosper as well as they could do in any other circumstances, and afford an easy insurance to the farmer against the heavy losses he is so often, without this aid, obliged to experience. I do not know an improvement in agriculture that is greater than this one, or that can be afforded with so little trouble or expence. Nothing can stand in the way of its being universally adopted, unless it be the difficulty of reconciling the interest of the tenant and the proprietor. As the law at present stands, the expence of making the plantation must fall upon the proprietor, seeing he is the sole owner of the wood; and the tenant ought to have permission to lop the branches occasionally, and be bound to preserve the plantation. It seems to be by no

means impossible to reconcile these interests; but this would require an exertion on both sides, which, in the present state of our knowledge, in regard to things of this sort, can scarcely, I am afraid, be expected.

§ III.

Of the larch tree, its value and uses.

BUT the larch is so much more valuable than the scotch fir, on all other accounts, that it is now universally preferred to it for plantations of large extent, in almost every situation. The quantities of this tree are, indeed, so numerous and so excellent, that these require only to be known in order to make it be propagated to a greater extent than any other tree whatever, that can be reared in this climate. I dare hardly even venture to mention these qualities, on the present occasion, lest I shall be accused of exaggeration; though the proofs that ascertain them are so strong as to be irresistible. As this tree has only been of late introduced into Britain, the qualities of its wood are not here as yet sufficiently under-

flood ; and it has been hitherto cultivated chiefly rather as an ornamental tree, than with a view to profit : for, wherever it has been introduced, it grows so freely, on almost every soil or situation ; it is so healthy, and so beautiful when in leaf ; is so highly ornamental, when covered with its abundant pink blossoms in the spring ; and is so elegant in its form, that it becomes instantly a favourite with every one who has begun to plant it.

The value of its wood remarked by Vitruvius.

—The larch (*Pinus Larix* Lin :) is a native of the southern parts of Europe, and eastern parts of Asia, and there the valuable qualities of its timber have been long known. Among the Romans it was employed, in preference to every other kind of wood in building, for all purposes where strength and durability were required ; and Vitruvius attributes the sudden decay of buildings erected in his time, when compared with the superior durability of more ancient structures, in a great measure to the want of larix-wood in the neighbourhood of Rome ; that kind of wood having been there exhausted before his time, and the expence of bringing it from a distance had become so high, as greatly to circum-

scribe the use of it. This tree is found in great abundance every where along the whole extent of that vast range of mountains called the Alps, and on those lesser hills that branch off from these. In all places there, where the situation prevents the young plants from being choaked by grafs, or cropped by animals while young, it springs up from self-sown seeds; and as it grows naturally straight, it presented itself to the distressed inhabitants round the borders of the Adriatic gulf, as the fittest material for piles to be driven into the mud, on which their houses might be reared, when they were forced to seek for refuge from the barbarous tribes who over-ran Italy in the middle ages, in the inaccessible marshes where Venice now stands. Immense numbers of these trees have been then felled and applied to this purpose; and thus has been afforded an opportunity for proving by a fair experiment, the incomparable durability of that timber. For it has been found by experience, when these buildings have occasion to be renewed, that after having stood many hundreds of years, these piles are not only uncorrupted, but have by time acquired, in this situation, a degree of hardness they did not originally possess: so that there is every appear-

ance that, in this particular situation, the wood may be deemed incorruptible.

Its extreme durability remarked by Doctor Pallas.—In other situations, it has been found to possess a durability nearly equal with the above. When Doctor Pallas, under the auspices of the Empress of all the Russias, was employed, a good many years ago, to make a survey of the eastern parts of her Asiatic dominions, he observed, in the peninsula of Kamtskatka, several *tumuli* that were evidently artificial; but these had been reared up at period so remote, that none of the present inhabitants of that country had any tradition even respecting their origin, or the uses for which they had been originally constructed. To obtain a knowledge of this he caused one of them to be opened up. In the centre of the mound, and on a level with the surface of the plain on which it stood, he found an oblong platform, protected by beams of wood joining each other at the top, and spreading wide below, like the roof of a house, and placed close together so as to prevent the earth from falling on the area; where had been deposited some human bodies stretched at full length, as appeared by the remains of skeletons there found. This kind of roof had

been covered over with earth to a great height; and thus had been formed the *tumuli* in question. The wood was larch: and here also it was found to be uncorrupted. How long it had remained there it is impossible to say; but from concomitant circumstances, it is probable it could not be less than several thousand years.

In both these instances, however, the wood was preserved from the air, and afford no fair proof of its durability in other situations. But there are not wanting proofs sufficient of its extreme durability for the purposes of common life, even in modern times, independent of facts that are on record concerning that circumstance in antient authors.

By Mr. Harte, and Admiral Greig.—The Reverend Mr. Harte, in his *Essays on Agriculture*, a most valuable performance, that is but too little known, enlarges on the economical uses of larch wood with great satisfaction. Among other particulars, he describes the manner in which the huts of the peasants in Carniola are constructed of it, with a kind of exultation that was natural to a good mind when it develops a beneficent contrivance, that tended so much to render the lot of the lower classes of mankind much more

comfortable than could be effected by any other means that had hitherto occurred to him.

These cottages are constructed entirely of larch wood: [I here quote from recollection only, not having the book at hand.] A squared beam is first laid flat on the ground where the wall is intended to be reared; into that, by means of tenons, cut out for that purpose, are fixed uprights, consisting of squared logs of the same, cut to the height of the intended wall, so close as to touch each other. A beam running parallel to the first receives their tops, and keeps them firm in their upright position. These are connected with the cross walls, which rise upwards in the proper form of a gabel. A roof is erected on these beams, in which, over the couples, are laid cingles of larch wood; and the hut is then finished to continue for ages. In erecting the walls, openings are left for doors and windows: and in the roof, places are made for the emission of smoke. When newly erected, the roof and all parts of the structure are white; but after a short time, there oozes out from the pores of the wood a kind of juice, that fills up every crannie, so as to cement the whole into one connected mass, without chinks of any kind, so as to become quite impervious either to wind or rain. This juice gradually har-

dens, and being of a darkish colour, the building is covered all over as if with a varnish, that is not affected by any vicissitudes of weather. As soon as this varnish appears, the peasant's care respecting his little habitation is at an end for ever. How long such a structure may last, without standing in need of any repairs, has not been ascertained; but if the work has been properly executed, and duly secured against the effects of wind and external injuries, it is much beyond the extent of the utmost period of human life. Were poor people, who in this country are secured from oppression in every respect, to have it in their power to have their cabins rendered thus secure against the injuries of weather, and the ravages of fire (for this wood so powerfully resists fire, that a flaming brand laid upon the roof, and suffered to burn till it were consumed, would not affect it) what a valuable addition it would make to the sum-total of human happiness! The late Admiral Greig, who had seen many such huts in Siberia, was earnest with the gentlemen in Scotland, when he made his last visit to his native country, to induce them to make extensive plantations of larch wood, insisting chiefly on this circumstance, and asserting that he had seen many huts, which had been thus constructed, and which

he was assured had stood more than *an hundred* years, without standing in need of the smallest repairs.

By M. le President de la Tour d'Aigues.—Of the durability of this wood the following facts are additional proofs: “ I have in my garden,
 “ (says M. le President de la Tour d'Aigues,) in
 “ the year 1787, some rails, part of which are
 “ oak, and part of them *larch wood*. The rails
 “ were made in the year 1743, and only once
 “ painted. *The oak has yielded to time, but the*
 “ *larch is still found*. They employ this wood
 “ at present in *Provence* for making casks. The
 “ chesnut of the Cevennes had supplied the
 “ place of the oak, and the larch now success-
 “ fully supplies that of the chesnut. The fine-
 “ ness of the grain retains perfectly the spirit of
 “ the liquor, and does not alter its qualities.
 “ It has been employed for that use for time
 “ immemorial in the higher Dauphinè, from
 “ *Sisteron* even to *Briançon*. I have in my
 “ castle of *Tour d'Aigues* beams of twenty inches
 “ square, which are found, though upwards of
 “ *two hundred years old*; but trees of this size
 “ are only now to be found in places whence
 “ they cannot be transported. There are in

“ some places of Dauphinè, and in the forests of
 “ Baye in Provence, larch trees, which two
 “ men could not grasp, and more than twelve
 “ toines (about 72 feet) in height.”

By a gentleman from Switzerland.—This wood has been remarked for the same indestructible quality wherever it has been employed in work. I myself happened to fall into company with a native of Switzerland, in the month of October last, [1794] in the house of the ingenious Doctor Percival of Manchester. The conversation happening to turn upon this subject, the Doctor asked that gentleman, if larch wood was much used in Switzerland? His answer was, “ Very much.” “ For what purposes is it chiefly employed?” “ For every use where strength and durability are required.” He added, that a short while before he came to Britain, he had been on a visit to an acquaintance in the country, who lived in a *chateau* that was known to be above two hundred years old, the very stones of which it was built being now mouldering to decay; and he remarked that the windows, which, by their fashion and workmanship, were judged to be the original windows that had been put into the house, did not discover the smallest

marks of decay. These windows were made of larch wood. He added, that the consumption of this wood in Switzerland, on account of its many valuable qualities, has been so great, as to exceed the quantity naturally produced : so that it has become scarce and dear ; which has induced many gentlemen in that country to make large plantations of it of late, with a view to the profit that may be derived from it.

By Mr Ritchie, british consul at Venice.—Mr Ritchie, the british *charge des affaires*, at Venice, writes thus to Mr Moore, secretary to the Society of Arts in the Strand, London, in answer to some queries respecting the uses that are made of larch wood in Venice. “ It resists, (says he,) “ the intemperature of the air more than any “ other wood known in this country, and therefore it is much used in outer gates, pales, &c. “ which are constantly exposed to the open air. “ It is no less durable within doors : and in some “ of the old palaces here, there are beams of “ *larix* as found as when first placed there. In “ a word, *Wherever strength and durability are “ required, this is reckoned here the most choice “ and valuable wood*, and it may be applied to “ a great number of uses.” Among these uses,

he particularly specifies *ship-building*, for which use they deem it the most valuable they have ; but, on account of the superior *levity* of fir wood, they in some cases prefer it in those seas, where the shallowness of the waters renders buoyancy a quality much prized. [Transact. of the Soc. of Arts, vol. xi.]

In Russia, also, their ships of war are built of larch wood, which is brought for that purpose, at a great expence, from the interior parts of Siberia to Archangel, for the royal dock-yards only. And that it was employed in old times, seems to be proved by the following singular fact recorded by Mr. Evelyn in his *Sylva*, article *Larix*.

By Mr. Evelyn.—"Witson, (says he) a Dutch
 " writer on ship-building, says, that a vessel,
 " constructed of this wood and cypress, was
 " lately (when did Witson write ?) found in the
 " Numidian Sea, twelve fathoms under water.
 " It was reduced to such a degree of hardness
 " as greatly to resist the sharpest tool. Nor did
 " it appear that any part of it had perished, al-
 " though it had continued under water above a
 " thousand and four hundred years."

Mr. Evelyn farther remarks, that it seems to excel for beams, doors, windows, and masts of ships, and *resists the worm*. When driven into the ground, it becomes in time almost petrified, and is capable of supporting an incredible weight. It makes, he says, everlasting spouts, pent houses, and featheredge, which need neither pitch nor painting to preserve them; also excellent pails, posts, rails and props for vines. The texture of the wood is close, and admits of a fine polish, so as to make beautiful finishing to rooms. It is neither liable to shrink nor warp, when put up into work; and, when cut into thin slices, it is the very best substance yet known for putting behind prints in framing. On account of these qualities, it is excellent for making pallets for painters to mix their colours upon. Before the use of canvas, it formed the tablets on which the great Raphael, and the famous artists of his time, eternised their art; and, on account of the fine polish it takes, has been supposed to give to their colours a peculiar grace and brilliancy. However that may be, it is certain that the modern Italians make use of this wood for picture-frames, because no other wood gives gilding such force, brightness, and as it were a sort of natural burnish; and this, he thinks, is the grand

secret why Italian gilding on wood is so much better than ours, which has often a tarnished spongy cast, and looks like gilt gingerbread. Among other qualities of this wood, Mr. Evelyn remarks that it resists the worm ; and that it does resist the worm in houses, is perfectly proved by the single fact that the paintings which have been done upon it for many hundred years, are still entire ; but I have met with no fact which proves that it will resist the sea worm ; though there is no instance on record that I have met with, in which it has been penetrated by that destructive creature.

Mr. Evelyn, for these and other properties that he found recorded concerning this wood, warmly recommended the culture of the larch tree to his countrymen : But the minds of men were not yet prepared to adopt this improvement, and he preached to them in vain. More than a hundred years elapsed after his death, before, perhaps, one person in the island was daring enough even to try if it would live here : what he in vain recommended we have seen in some measure effected. It is now known to thrive every where ; but our descendants only can see the wood in perfection of the produce of this island.

In all the foregoing instances, the experiments, we may suppose, respect that wood when it has attained full maturity, and is in the highest state of perfection it can be made to attain. But it is well known that any kind of fir-wood that has grown very quickly, and is as yet young, though it should have attained a considerable size, consists chiefly of a kind of imperfect timber, of the nature of that imperfect kind of wood which is in general found in a ring of more or less thickness round the tree, immediately under the bark, which has been commonly called *blae*, because of its pale and sickly colour, to distinguish it from the harder and better ripened wood nearer the heart; which, especially in old trees, is of a red colour, and is therefore called *red wood*. It is now well known that the best fir timber which comes from Riga, and other places on the Baltic, is the produce of the same tree that is commonly cultivated here under the name of the *scotch fir*; but having grown, for the most part, more slowly in these countries than the *planted* trees do here, and having been allowed to attain a much greater age, that wood is beyond comparison closer, and four times at least more durable, in any kind of work, than the

young raw deals which are made from wood the usual growth of this country. The same circumstances attend the growth, and, we have reason to believe, the other qualities of larch timber: The larch is thus described by an acquaintance of mine who crossed the Alps in October 1793: “ I saw, said he, larch, or larix, cut down about thirty miles south of Bolzano, at an elevation of more than two miles perpendicular height above the valley and river Adige, some of which were near three feet diameter, and all *red wood*, the effect of age, except a ring of less than an inch on the outside. The timber remarkably fine, hard and strong. The larch is now generally planted all over Britain. If it is left to grow to a sufficient age, the owners will not be disappointed.” We have not, however, yet had an opportunity of seeing any of that *aged* larch wood in Scotland; for its introduction into this country was at a period so late as not to admit of it. The two first trees of that wood which were planted in Britain, by the best account I can find, are at Dunkeld in Perthshire, the seat of the Duke of Athole, in a most thriving condition, and are not likely to be permitted to be cut down soon. They are known to be now exactly 53 years of age. Two

years ago, they measured as under ; as communicated to me by Mr. Scougal, then gardener to the Duke of Athole.

“ The larch trees are fifty years old ; they are
 “ 120 feet high, three feet and a half diameter,
 “ one yard above the ground ; and are said to contain 110 (this is evidently a mistake ; from the
 “ measurement given it ought to be 360) cubic
 “ feet of wood each in the trunk, exclusive of
 “ branches.” A surprising growth ! This is at the rate of $2\frac{1}{4}$ cubic feet nearly each year, which, valuing it only at one shilling *per* foot, would be 2s. 3d. exclusive of branches.

In order to ascertain this fact with more precision, I applied to the Duke of Athole's present gardener ; in answer to which I received the following letter.

“ SIR, DUNKELD, *March*, 28, 1796.

The gardener here has delivered to me your letter of the 26th current ; in consequence of which, an exact measurement has been made of the largest *larix* tree on the Duke of Athole's lawn at Dunkeld. And the following are its dimensions.

ON WASTE LANDS. 311

<i>F. In.</i>				<i>F. In.</i>			
At the height of 1 8 from the ground,							
circumference is				11	11		
—	—	—	3 0	—	—	—	10 0½
—	—	—	6 0	—	—	—	9 0
—	—	—	9 0	—	—	—	8 6
—	—	—	12 0	—	—	—	8 2
—	—	—	18 0	—	—	—	7 11
—	—	—	24 0	—	—	—	7 7

“ The above is from actual measurement : the following is computed.

<i>F. In.</i>				<i>F. In.</i>			
At the height of 48 0 from the ground, cir-							
cumference may be				6	0		
—	—	—	70 0	—	—	—	3 0

from whence it tapers to a top about 15 feet : so the whole height is 85 feet, planted in spring 1741. There are several larix upwards of 100 feet in height, which are 5 or 6 years younger, but none of so great girth.

“ Of late years, the Duke of Athole has, to make trial of the wood, applied larch to a variety of purposes ; such as mill-axles, flooring in houses, window-frames, and doors, post, and rail, and boat-building ; for all of which it has hither-

to appeared to answer so well, that it is certainly the greatest acquisition of wood ever introduced into Great Britain ; the more especially, as it not only grows, but attains a considerable size in situations where, from the elevation of the ground, and bleak exposure, scotch firs either die, or become stunted. Fishing boats made of larch under forty years old, last nearly three times as long as those built of Norway fir. The Duke is so persuaded of the excellence of the wood, that his plantations, on high grounds particularly, have of late years been almost entirely composed of that wood. Those plantations though large, generally exceeding 100,000 every year, would have been more extensive, if the trees were not obliged to be pitted in planting them, the trees having attained some size ; viz. from 20 inches to 3 feet, by being two years and sometimes longer transplanted from the feed-beds into others, before put out to stand, in order to prevent their being choaked by the undergrowth of broom and whins, which rise very rapidly in the neighbourhood of Dunkeld : but where there are not these disadvantages, it is imagined they might be planted with success from the seed-bed, in the same way as scotch firs : an experiment which is to be tried. The only draw-back to that will be,

that both wild and tame animals, which may break into the plantations, would be apt to browse on the top-shoots of larch, a tree they are particularly fond of; but, if that is not very often repeated, the larch will still push forward on a new leader, and rise.

“ The late violent winds blew over a larix, in the Duke’s lawn, of 50 years age, 86 feet 6 inches in height, containing 82 feet of solid wood; for which 4l. sterling was offered as it lay on the ground. I am, Sir, your obedient servant.

(Signed) GEORGE FARQUHAR.”

I have found by experience, that pitting, as mentioned above, is not necessary, unless where grass or other weeds grow with such luxuriance as to endanger smothering the young plants.

Even young larch wood particularly durable.—
The following facts, which respect raw grown wood in this country, tend to prove, in the most satisfactory manner, that, *even in that state*, larch wood possesses qualities of the most valuable kind, that would be deemed fabulous, were they not well authenticated.

In January 1772, a violent wind, which committed great devastations in Scotland, overturn-

ed, among others, two or three larch trees that grew in the plantations of Mr. Campbell of Shawfield, at Woodhall, near Glasgow. These trees were so large as to admit of being cut up into planks, which were not particularly attended to by the late Mr. Campbell, who was then alive. About ten years afterwards, his brother, the present very respectable owner, succeeded to that estate; and finding, in his rounds, a low house made of boards which had been employed for feeding swine, in a waste corner, under the drip of some large trees, that had been neglected for many years, which he thought a very unsightly object; ordered it to be taken down and carried away as rubbish. The carpenter, when he began to knock it to peices, was extremely surprised to find the wood quite fresh, and mentioned it to Mr. Campbell, as a very unusual circumstance; telling him, at the same time, that he now recognised that these sheds had been made of the larch wood above named. Some time afterwards, being ordered to repair the top of some stalls in the stable, that had been gnawed by the horses, on that occasion the carpenter said, he did not know how he could then do it, as he happened to have no seasoned wood at the time, and could get none in that neighbour-

hood. Mr. Campbell, recollecting that he had said the wood of the swine-house was quite fresh, desired him to examine it, and see if that could be made to answer the purpose. It was tried, and found to be perfectly good; and having been put up, stood there, without any marks of decay, for several years, till, in consequence of some considerable alterations that were making, the whole of these stalls were taken away, and these pieces of larch wood lost sight of.

The same gentleman having afterwards learnt, that on the coast of Lincolnshire, where decoys for catching wild ducks are made, in doing which, it becomes necessary to drive many stakes into the mud overflowed by the sea, for the purpose of stretching the nets, (which stakes are found to be very expensive to uphold, as oak stakes, between low and high water-mark, very soon decay,)—one gentleman, wishing to try the durability of larch wood in these circumstances, put alternate stakes of larch and oak. Two sets of oak wood had been entirely worn out, as his informant assured him, and the larch continued firm. How long they may still last, it is impossible to say.

Mr. Campbell, desirous of making a comparative trial himself, made two gates, the supporters

of which were to be of timber ; one of the posts in each gate he caused to be made of larch wood ; and the other, of the same size and shape, of the best foreign fir he could find. They were both painted, for the sake of neatness and uniformity. One set of the fir stakes were worn out some time ago, and have been renewed.—The larch stands firm till this hour ; and how many sets of fir posts they may outlast, no one can tell.

Since the first edition of this work was printed, the following fact respecting larch wood has been stated to me.

About twenty years ago, my informant chanced to be upon a visit to the late Lord Auchinleck, at his country seat in Ayrshire ; when the gardener, an old man, came one morning to inform his Lordship, that a wooden rail which had been put up as a fence many years ago, around his (the gardener's) little garden, having been often repaired, was now become so very frail, that it did not admit of being repaired any more with profit. His Lordship on hearing this, ordered the old rail to be taken down, and a new one to be put up in its place. The gardener went out to execute this order ; but in a short time he returned, with a joyous expression in his coun-

tenance. "What is the matter, John," said his Lordship. 'Nothing, an't please your honour; only that I bring you news that will please you.' "What is that, John?" 'Why,' says John, 'your Lordship has always been very fond of the larix, and I have just discovered that it's wood is much more valuable than I ever before suspected. On knocking down the fence round my garden, the posts were all quite rotted, so as to fall down with the first stroke; except a few which are quite fresh and firm. I found that all these were of larch wood, a few spars of larix having been put up with the others when the fence was made; and all these are now as fresh as the day they were first put up, though all the others are quite rotten.' "Come," said his Lordship to his friend, "let us go and see this wonder with our own eyes." They went immediately to the spot, and found it exactly as John had represented.—Orders were given to leave these posts as they were, and to supply the place of those that were decayed only. In this way, the fence was renewed; and my informant, who has been often at the place since that time, says he is perfectly convinced the larch posts remain firm in that rail till the present moment.

This fact having awakened their curiosity, they went to examine some other pieces of larch wood that had been employed for other uses. Among these was a kind of bridge thrown across a rill of water, consisting of three or four spars of young larch wood, covered with fods. This bridge had been made a good many years before. On removing some of the fods, they found the wood perfectly firm : on which the fods were replaced, and the bridge, it is believed, remains till the present hour.

I myself happened to observe a spire of young larch wood, in the garden of Mr. Dempster, who has been so long distinguished for his conduct in the British Parliament, which had been stuck into the ground as a pole for a plant of hops, and allowed to stand there summer and winter, for the space, as he found, upon enquiry, of more than six years : on a careful examination of it, no symptom whatever of rotting could be discovered in it any where.

This, and other facts, having turned my attention to the subject of larch wood very strongly, I caused some spires to be cut out from a plantation I had made of larch in Aberdeenshire, and sent to this place (in the neighbourhood of Leith) for the sake of experiment. These spires were

of no more than eight years growth, at the time they were cut, and were upwards of twenty feet high. Of some of these I caused a rude seat to be made for a garden, the joinings being made merely by boring holes with an auger into the parts that were to receive the ends of other pieces, which were shaped so as to fit the holes. The bark was not taken off; and some of the smallest pieces in the top, not thicker than my finger, were thus placed as uprights in the back. It is five years since the wood was cut, and four years since the seat was made, which has stood since that time in a place where it is exposed to the sun and weather, with only the partial shelter of a few branches of a tree over head. No marks of rotting are as yet (March 1st 1797,) discoverable on any part of it, nor of the other spires, which have lain without doors all that time, in various circumstances. But what appears still more extraordinary to me, is, that it has neither gelled (split by the action of the sun,) nor shrunk, so as to loosen the joints, which still continue firm.

I beg leave, however, to observe, that though I cannot discover the smallest symptoms of rotting on any part of these spires; yet, upon a very accurate examination, *it appears to me* that the

wood is rather of less specific gravity than it was at first, which I doubt not proceeds from an imperceptible kind of decay, which I suppose will in time render it, as we call it, *daezed*, that is, less strong than it originally was, though not apparently rotten. Even this, however, is not a *certainty*; perhaps I may be mistaken in thinking it lighter than the *dried* wood, while yet fresh cut down: for I could not compare them accurately together at the same time, and did not think of *weighing* the same pieces at different periods: but how long it may be before that period shall arrive, so as to render it brittle, I cannot tell. It doubtless is not yet arrived, even with regard to the smallest pieces of no more than one year's growth, which are still firm and tough to an astonishing degree, considering the raw and unsubstantial nature of the half-formed wood of these tender twigs.

In addition to these facts, and to show that every twig of this tree may be employed for some useful purpose, I shall just add, that George Newnham, Esq; of Summerhill, near Corke, informed me, *anno* 1793, that he employed some *branches* of larch wood as stakes for espalier trees in his garden, some years ago, intermixed with stakes of various other sorts; all which larch stakes

remained firm after the others began to decay. In a subsequent letter, dated November 10th, 1794, he says, "The stakes of larch wood still remain
 " in my garden perfectly sound, both above and
 " below ground; the moisture seems to harden
 " the wood in a surprising manner; the stakes of
 " the other timber are in general quite decayed."

These facts establish, beyond a possibility of doubt, the incomparable durability of this wood even in *the early* periods of its growth; a circumstance which is of too much importance to the landed and agricultural interest of this country to require any apology in me for endeavouring to establish, beyond a possibility of doubt, at the expence of a few additional pages of writing.

Larch wood neither shrinks nor warps, nor is eaten by worms.—Nor is *durability* alone it's only quality. When made into plank, there are proofs equally incontestible that it possesses the additional excellency of neither *shrinking* nor *warping* when made into work, nor of being liable to be attacked by the worm, during the course of several ages. The single fact already quoted from Evelyn, that Raphael, Urbin, and other celebrated artists of that age, painted many of their best pictures on larch wood, which exist till this day

found and entire, establishes these things beyond a doubt. Most of these pictures are now upwards of three hundred years old: it is obvious that the smallest warping, or shrinking in the wood, must have cracked and destroyed the paintings: nor are any worm holes discovered on examining the back of the boards.

Whether this wood is capable of resisting the sea worm, I have not been able to ascertain by actual experiment. The entire state of the vessel found in the Numidian sea, and many other circumstances, concur to render this probable. But a fact of this importance ought not to be left on the footing of *probability* only. I have been for four years past in diligent quest of two things which I have not been able to find: the *first* is, a piece of larch wood actually in a state of rottenness, no matter by what means it has been produced; but none of my correspondents have been able to help me to it: the *second* is, a piece of sound, well ripened larch wood, in a state of perfection, for the purpose of trying fairly whether it be capable of resisting the sea worm or not. It is well known that at the bridge of Rochester near Chatham, every other kind of wood that is sunk but for a very short time into the waters of the river Medway, is very soon perforated by the

sea-worm. My intention was, if I could have found the larch wood, to cause it to be fastened, by means of cross bars to a logg of sound oak wood, of the same dimensions, and both of them to be sunk in the river at the same time. Let them be taken up, after lying some months, and examined: they may be then returned again into the water or not, as circumstances seem to indicate. Thus would a fair comparative trial be made, the result of which, in all it's circumstances, ought to be communicated to the public. I reject raw and imperfect wood from this experiment, for very obvious reasons.

Larch wood nearly incombustible.—To all these valuable qualities, justice still compels me to add, that larch wood may be said to be in some measure *incombustible*. In consequence of it's inaptitude to take fire, Mr. Harte observes, that there is perhaps no instance of the cabins of the Carnioleans being set on fire, though they are careles about throwing even flaming firebrands upon their roofs. The fact is, that though larch wood may be consumed by fire, yet, where the masses are large, even if a fire were placed upon the bare wood, though it might be slowly corroded by it, and, in time, might thus have a hole eaten

into it; yet, unless in particular circumstances, it could not be made to flame, so as to communicate it to other bodies. This quality of larch wood was known in the days of Julius Cæsar, who calls it *lignum igni impenetrabile*. So great is it's inaptitude to burn, that a philosopher in Italy thought he had made a great discovery, during the last century, and actually published a book, for the express purpose of convincing his countrymen, that it was *possible* to employ larch wood, on certain occasions, for the purpose of incineration; but his experiments went no farther than to show, that it was possible to make billets of that wood, when not of a very large size, actually flame: but to make it burn well, a blast furnace is absolutely necessary. By this means, his treatise proves, in the clearest manner, the general proposition announced above; viz. that larch wood, in ordinary circumstances, may be said to be unflammable. That it may be consumed in *a blast furnace* has, however, been long known: and the charcoal made of this wood, when thus employed, is deemed much more valuable than any other, for the purpose of smelting iron: probably it admits of being made to produce a more intense degree of heat. I shall have occasion to show below, that my countrymen have

discovered a way by which this quality of the tree renders it peculiarly valuable as a fire wood.

Larch, the shittim wood of Scripture.—On this head, it is worth while to remark, that an ingenious French critic contends, that the table of *shittim* wood, which was kept in the Jewish ark for sacrifices, must have been made of larch, as no other kind of wood is known to possess the same incombustible quality. The cedar of Lebanon, which was so much prized in antiquity for it's many valuable qualities, is well known to be very nearly allied to the *larix* in many of it's characteristics, both in botany and economics.

The larch is of very quick growth.—Having thus proved, beyond a doubt, that the *larix*, on account of the very valuable qualities of the wood, deserves to be cultivated in every part of this country; I shall next proceed to show, that, on account of it's quickness of growth, and the variety of soils and exposures on which it may be made to thrive, [it's beauty is universally admitted,] it deserves to be extensively cultivated in every part of this country, as one of the most *profitable*, as well as the most useful, productions that can be reared in these northern regions.

326 OF PLANTATIONS

As to it's quickness of growth, the following facts will prove satisfactory.

Mr. Newnham, before quoted, sends me the measurement of eight trees in a small plantation of his, in the spring and autumn of the year 1794, which were as in the following table :

No.	Height.		Height.		Increase.	
	F.	In.	F.	In.	F.	In.
" 1 in Mar. last	6	0	in Nov.	10 0	—	4 0
2 — —	5	9	—	10 0	—	4 3
3 — —	5	2	—	9 0	—	3 10
4 — —	4	6	—	7 6	—	3 0
5 — —	5	7	—	9 10	—	4 3
6 — —	5	1	—	9 2	—	4 1
7 — —	4	3	—	7 10½	—	3 7½
8 — —	6	3	—	10 5	—	4 2

Average 5 4 nearly 9 2¼ 3 9¼ nearly

" N. B. No. 1, encreased in circumference 3 inches, measured 2 feet from the ground.

" No. 6th, not quite two inches."

But as it may be suspected that these are only a few of the best, I beg leave to add, that in the plantation from which my spires were cut, the trees, at *eight* years growth, measured, over the whole plantation, above 20 feet in height on an average ; the trees were from six to nine inches

high when planted. They now, being 12 years old, measure on an average about from 34 to 36 feet in height. This plantation was made on a very good soil, and favourably situated. The particulars of the culture, to which I must attribute their quick growth in some degree, will be afterwards specified.

Nor is it only while the tree is young that it makes these vigorous shoots; for it appears, by the measurement of the trees in Dunkeld, that this in a great measure continues even till a period of age beyond that which they have as yet attained in this island: for 120 feet, in 50 years, gives an average of nearly 2 feet and a half in height for each year of their growth. What a pleasing thing it is for a man to have a certainty of seeing such fine trees of his own planting, if he begins while in the vigour of life, and attains to only a moderate age! What a short time to look back is twelve years;—Look at a plantation, of 35 feet in height, what a beautiful object it is! Such are the allurements in point of pleasure only. Let us now turn our views to profit, which ought to be the chief object in every extensive operation in rural affairs.

The greatest obstruction to the planting of trees is the prospect that a long period must elapse

before any emolument can be derived from these plantations. This operates as a strong bar to exertions of this sort : for a few years, to look forward, appears a long period : but when it is past, it seems but as yesterday ; and it is then we regret the advantages we might have enjoyed, had we not let slip the golden opportunity which we so carelessly neglected to improve, while it was in our power. Let him who reads this not dwell upon the past : to him it is gone for ever, and cannot be recalled. But let him remember that time now is. Let the present moment then be improved : for, if he does not, he will have the same mortifying reflections to make a few years hence. There is scarcely one man alive who is so old as to need to despair of drawing profit, even in his own life-time, from the plantations he may now make ; and he is certain that if death does not overtake him directly, his mind will be soothed with the pleasing prospect of being benefited by his labours, and the certainty of deriving pleasure from their thriving condition in the mean while.

It is a singular felicity, in making a plantation of larches, that the wood can be applied to a variety of useful purposes *while it is yet of a very small size* ; and that, independent of the profit it

will thus immediately bring, an extensive plantation of that wood will, in a very short time, furnish employment to a great number of persons in manufacturing the various articles that can be made of it; who will thus contribute to his pleasure and emolument in a thousand ways that cannot be enumerated. For whatever calls forth the exertions of human industry, and furnishes the means of subsistence to a numerous people, especially when they are necessarily resident in the country, adds to the prosperity of the state, and contributes to the direct emolument of the person on whose property they are placed, in a more powerful manner than perhaps any other circumstance whatever. Thus does a plantation of larches mediately operate as a sort of creation of the human race. It calls beings into existence who never would have participated of life; and diffuses happiness and joy where gloomy solitude alone must long have kept her dreary abode.

The larch grows on almost any soil.—To show how these changes may naturally be effected, it is necessary here to recal what has been already said, that the larix can be made to grow upon almost any soil, even from a stiff clay to a barren sand, if not drowned in water; and in almost

every situation where trees of any sort can be made to grow in this climate ; so that no tree hitherto known is of such extensive influence. And though we shall soon see that it might be planted with profit, even upon good land, yet it does not refuse to grow upon the worst. Every proprietor of land, therefore, may, if he pleases, be benefited by this improvement. If his land be good, the profits will be the sooner derived. If it be bad, they will be equally certain, though the returns will not be so quick, or the produce in an equal number of years, so abundant.

*A plantation of larches will yield some return in 6 or 8 years—*On good land, and under skilful management, one who makes a plantation of larches, may begin to draw a return from his land in half a dozen of years, from which period he may draw a continually encreasing annual return for the whole remaining years of his life, and leave to his heir, at his death, a value in timber upon the land, worth perhaps ten times it's original purchase-price. This is the direct profit : but when the collateral advantages that may be derived from an encreased population of prosperous people, in a country that is but in part improved, is taken into the account, the benefits

are past computation, when plantations have been made upon lands that were originally of little value. And as to the objection, that if every one were to do this, the market would soon be overstocked, it is true: but as every one will not do this, those who first begin it, have the certainty of deriving the greatest benefit from their exertions. What a stimulus ought this to be for immediate exertions! Before the first planted woods come to full sale, the value of the timber will be known, and no quantity sufficient will be brought to market to supply the demand.

Uses to which young larch wood may be applied.
 —*Hay rakes.*—In six, eight, or ten years, according to soil and circumstances, the trees will have attained a size sufficient to be made into hay rakes, and several useful articles. This timber grows so straight; it is, at the same time, so light, so strong, and so durable, as to be peculiarly calculated for making hay rakes; and, from the peculiarity of its shrinking less than any other wood, these rakes must remain longer firm than those made of any other wood whatever. About two feet cut off from the root end, will form the rake-head; and five feet above that, with a very little taken off from the thickness of the under

part of it, will form the handle. No wood is more proper for the teeth of the rake, than some larch taken from the red wood of an older tree, split up for that purpose ; because it is not only tough, but little liable either to split or shrink, and will, of course, be less apt to loosen than any other. The bow may be made of ash, or, what is still better, because both cheaper and lighter, though equally serviceable, of some of the wood of the laurel-leaved sweet scented willow, (*Salix pentandria*) split up for that purpose. The making of these rakes, and other articles, will furnish employment throughout the year to many persons.

Shafts for hoes, handles for brooms, scythes, &c.

—Many other uses may be made of the trees of this size. Among others, nothing is so fit for shafts to hoes: for it is nearly as strong, and much more durable, than ash, which alone has been hitherto employed for that purpose ; and the hoe-heads keep much better upon it than on any kind of ash wood. Handles for brushes, brooms, scythes, and innumerable articles of this sort, would occasion a vast consumption of these small spars.

Chairs.—Of the wood of this kind, also, might be made light, neat, and strong chairs for rush bottoms. In compliance with my wishes, some chairs of this sort were made of these small spires for a trial. The joiner objected to it at first, because it is found that when other kinds of wood are worked up with the heart in it, they are apt to split; and if fixed by boring only, they shrink so much as soon to shake loose, which it was expected would happen in like manner with the larch. The result of the experiment happily belied the prediction. The chairs keep firm.

Hop-poles, hurdles, gates.—In places where hop-poles are wanted, nothing in nature can be found that will answer this purpose so well as the larch: for one set of these would last against two or three sets of ash wood. Hurdles, spars, and gates, could be made of these, both lighter and more durable than any other woods whatever; and when the trees are of a size sufficient for that purpose, they may be split down for cart shafts; and in mining countries, they could be employed as posts for supporting the roofs of coal-mines, and other uses of that kind, with singular economy.

Neat and durable railing, hen-coops, &c.—The small tops cut off in making these various works, would furnish a neat, elegant, cheap and durable kind of railing, for being put upon the top of low walls, and other things of that kind, for ornament as well as use ; especially for preventing light sheep from over-leaping wall fences. One end of them might be let into the coping, whether made of sod, of clay, or of lime, as occasion required ; and the other end be received into a slip of sawn larch wood, with holes bored through it to receive their points. From the straightness of the wood, even without any work, this kind of rail would be made extremely neat, and at the most trifling expence. In the same manner might be made of these materials, hen-coops, crates for packing glass, and a variety of other articles, of which I have at present no knowledge.

Fences for fields.—But one of the most extensive and beneficial uses that would be made of this kind of small wood, would be for the purposes of inclosing. These spars, when the root cut was thick enough to admit of it, might be slit up the middle by a saw, and cut into lengths of five or six feet ; or, where smaller, they may

be employed whole. As they are always straight, and nearly of an uniform thickness, these, if driven into the ground for a few inches in a row, at a few inches distant from each other, with the split sides all in one side, and the round sides on the other, would make one of the neatest and most compleat fences that can be seen: The tops of these uprights being received into a piece of sawed board, with bored holes in it for that purpose; and supported at due distances within side or without, by diagonal (sloping) *rances*, reaching from the ground to the top. I have seen some fences of this sort, made of common scotch fir, and nothing can be neater; but unfortunately these want durability, which would not be the case of those made of larch wood.

Windows, joists, flooring, ship-building.—These are a few of the uses to which the small spires, arising from the first thinnings of these plantations, might be applied. As they advanced to a larger size, the application of them to the various domestic uses are so obvious and apparent, that it is quite unnecessary to enumerate them. It may be only proper to mention, that for windows, joists, flooring, panelling,

couples, and every other purpose in building, these, if made of larch, would be much more perfect than any of the kinds of wood we have been hitherto obliged to employ for these purposes; and for ship-building, especially plank, it would be evidently superior to the oak itself: so that in a few years, this island would be able to supply within itself abundant materials for her own navy and numerous merchantmen; without being in danger of being obliged to depend upon foreign nations for these necessary articles; the prospect of which, for many years past, has occasioned so just an alarm among the people of Britain.

Barrel staves.—To these I shall only add, that the necessary articles of barrel staves and heading might be furnished by ourselves without the aid of other nations. And this, if ever the fisheries shall *be permitted* to be carried on along our coasts, to the extent they necessarily will be, if ever a Legislature shall be found so enlightened as to perceive the benefits that would result from taking off those shackles that have condemned so many thousands of her best subjects to wretchedness and want, for centuries past, will be found to be a matter of much greater

consequence than is at present imagined: for the unnecessary expence of barrels, for these low priced articles, greatly enhances their price in foreign markets, and retards their sale, in the present situation of things.

Hoops.—Of the larch also may be made *hoops* for barrels of all kinds that will be cheaper and more durable than any other that has ever yet been adopted. When the larch is new cut down it possesses a degree of flexibility equal to the willow. If it be immediately sawed out into plank of a proper degree of thickness, it may be then bent into the form of a hoop of the smallest size with the utmost flexibility; and, if that plank be run down into slips of the proper breadth, it will make the neatest hoops that can be imagined, being of an uniform strength and thickness in every part. These hoops, if made up into coils of a proper size, when fresh cut up, would easily take the set so as to keep it, and would only require to be steeped for a proper time in water when they were to be put upon the barrels, so as to admit of being brought to the true size as required.

Hoops of this kind would be useful for barrels of every sort; but they would be peculiarly

valuable to the West-India merchant, who is often subjected to heavy losses from the rotting of the hoops on his rum puncheons on their passage home, by which much leakage is incurred, and sometimes even the whole liquor is suffered to run to waste. From the extreme durability of larch wood, there is no room to apprehend that the smallest tendency to decay would be perceived on these hoops during this passage. It is scarcely necessary to add, that the best larch plank, and that alone which is free from knots, would be proper for making hoops, so that it will probably be many years before we can obtain much timber proper for hoops in this country, where no attention has hitherto been bestowed on rearing larch wood free from knots.

Uses of larch brush-wood.—Hitherto I have only spoken of the uses that may be made of the *stems* of these trees; but there is not a branch, nor the twig of a bit of the brush, that may not be employed, with great economy, to some useful purpose. The larger branches might be employed for fencing of various kinds, and the smaller pieces of brush might be applied to the various uses I shall now specify.

For filling drains.—Wherever draining is wanted, which is the case in almost every district in this kingdom, nothing could facilitate this operation so much as abundance of larch brush. All other kinds of brush-wood are so perishable, that however desirable it may be, in other respects, to employ these materials, yet the drains are so soon choked up by the rotting of the brush, that it has been found necessary to resort to other materials, which cost a much greater price, in place of them. Hence drains are now almost universally filled with stone or brick ; but these articles, even where they can be obtained, are so expensive, as to have greatly retarded the practice of under-draining, and, with that, diminished the general produce of the nation to an astonishing degree. As larch brush is nearly indestructible by rotting, this inconvenience would be thereby removed.

For fuel.—In countries, too, where fuel is scarce, nothing could so well supply the want of it as the brush of larch wood ; and here a peculiarity occurs, that greatly distinguishes this tree, in an economical sense, from all others. In regard to all other trees, considered as fuel, it is the *wood*, and not the small branches,

which forms the best fuel ; but it is quite the reverse with the larch, the *wood* of which cannot be applied to this use ; but in return, the small branches of this tree are found to make a fire nearly equally well with the larger billets of other trees. This is a discovery that was made, as most others have been, by accident, in the south of Scotland, a few years ago, that deserves to be generally known.

A gentleman, who owns a small estate in Etrick forest, where coals are at a great distance, and fuel very scarce, thought he could not employ a considerable part of his land to a better use than that of planting trees upon it, chiefly with a view to sell them for fire wood. At the beginning, he planted scarcely any other tree except the scotch fir ; but observing, by degrees, the superior luxuriance and rapidity of growth of the *larix*, he gradually began to plant some of these, encreasing the number more and more, from year to year, as he came better to remark their superiority over the others. When his plantations had advanced some years, he began to lop the under branches from the trees as they encroached on each other ; and carrying these branches to a fide, he arranged them into lots of a convenient size for sale, and then sold

them on a fixed day, by auction, to the highest bidder. As his larches came forward, he treated them exactly in the same manner; and arranging these in heaps similar to those of the fir, they were sold at the same time with the others. Soon after he began thus to prune the larches, he was not a little surprized to find, that a heap of larch brush sold readily at double the price at least that the same persons would give for one of fir of the same size. On asking the reason of this striking peculiarity, the purchasers ingenuously told him, that when they put a faggot of fir-brush upon the fire, it got up into a blaze, and was almost instantly consumed, so as to be of little service, and occasion much trouble and inconvenience; but when they put a faggot of larch upon the grate, it took fire more slowly, did not burn so fiercely, but continued, with a clear steady heat, nearly as long, and with as good effect, as billet-wood of fir would do. Thus did experience teach them a lesson of the utmost consequence in rural economy, and clearly established the fact, that there is scarcely a situation in this island in which the smallest twig of this inestimable tree may not be applied to some very useful purpose in life.

I shall proceed to treat of the manner in which this tree may be reared with economy; after having mentioned one other valuable article that may be drawn from it, without either hurting the tree, or diminishing it's value in any respect.

Venice turpentine yielded by the larch tree.— In the Venetian territories, where this tree has abounded for many ages, the natives have been long in the practice of extracting from it a semi-fluid balsam, which, from the place where it is chiefly procured, has obtained the name of *Venice turpentine*. There are two kinds of Venice turpentine: one of them is extracted from the bark of the *silver* fir, by a peculiar process; this is deemed the finest sort. The other, which is somewhat inferior in quality is extracted from the larch tree. This resin of the *larix* is not found in the bark, but in the body of the tree itself. It is not to be obtained in considerable quantities from very young trees; and when the wood begins to grow more slowly through age, the turpentine gradually dries up, till at last it affords none at all: It is only after the tree has attained the thickness of ten or twelve inches diameter that it is thought worth while to ga-

ther the turpentine ; and from that time, for forty or fifty years, if it continue so long in vigorous growth, the tree will continue to yield an annual produce of from seven to eight pounds of turpentine from each tree. I do not know the exact price at which this substance sells; but believe it is from three-pence to four-pence *per* pound : suppose it to be no more than two-pence, and that the annual produce is six pounds, that would be at the rate of one shilling each tree *per annum*. The gathering of which, though not expensive, would add to the employment of the people.—The method practised is this :

A hole is bored by an auger into the tree near the root, slanting a little upward till it reaches near to the heart of the tree : into this is fitted a kind of cock, to conduct the balsam, which oozes out of it in a semi-fluid state, into a vessel suspended at the cock for receiving it. This process is continued from the end of May till the end of September ; the operator usually going over the wood once a day, to examine the receivers, and empty what is collected into a general receiver to be carried home. When the trees will yield no more for that season, the whole balsam that has been obtained is pressed through a

cloth to purify it, and is thus brought to market. It continues always in a semi-fluid state.

An English acre will contain 682 trees, at the distance of eight feet from each other: at the rate above mentioned, the value of the produce in turpentine would be 34l. 2s. *per annum, per acre*, on the supposition that the trees should yield as much of that substance in Britain, as on the borders of the Adriatic Gulf. Whether it will do so, remains to be ascertained by experience. I have never heard of a single trial that has been made in Britain, with a view to ascertain this circumstance. The produce above given, is mentioned upon the authority of M. du Hamel, whose general character for accuracy stands high in the republic of letters.

Manne de Briançon.—In the south of France they also gather from this tree a substance which is celebrated by the authors of Dauphiné, under the name of Briançon Manna. *Manne de Briançon.* It is found in the form of a hoary powder, early in the morning. With the value and uses of this manna I am a stranger, having never seen any of it. It is also said, that at Venice, the bark of this tree is employed for the purpose of tanning; but as the virtues of it in this respect

are not known in Britain, I put no reliance upon it.

§ IV.

*Directions for rearing plantations of larch trees
for profit.*

HITHERTO the larch tree has been cultivated in Britain chiefly for ornament, and it is only of late that the mode of rearing it with economy, *for profit*, has begun to be adverted to. It is in this last point of view, alone, I am at present to consider it; so that ornamental plantations must be here put out of the question.

It has been a very general practice in this country, to mix all kinds of trees together, in making a plantation, unless where these consist entirely of the scotch fir. Fir plantations were very universally adopted till of late years, especially in the northern parts of Scotland, where young plants of fir are reared at a very low price,

The larch should be planted entirely by itself.—
As larch plants began to become common, a

few of these were gradually interspersed among firs or other trees; but it has been found, by experience, that when this is done, in almost every situation or circumstances, the larch so much outgrows the fir, and every other tree, that it soon overtops them; in which situation, where the plants of larch are thinly scattered, at a distance from each other, they are exposed to the violence of the wind, without sufficient shelter, which bends and twists their tender top-shoots, so as greatly to retard its growth, and to disfigure the tree.

Having observed this to be invariably the case, it occurred to me, above a dozen of years ago, that no plant could be found so proper for affording shelter to the larch as the *larix* itself, which, if planted thick enough, would soon intermix branches, and thus give and receive mutual support on all occasions. With this view was made the plantation of larches so often mentioned above, in which the young trees were at first planted at the distance of no more than two feet asunder. The consequence has been, that they have rushed up with a rapidity unknown in any other situation; and the trees are so straight, so clean, and so healthy, in all respects, as abundantly to prove that this is the proper mode of culture to be

adopted wherever this tree is intended to be reared with *profit*. On this, as a sure foundation, the superstructure now to be described may be safely raised.

Difference between natural grown woods and plantations.—It has been often remarked, that no wood of the fir tribe, which has been reared in artificial plantations, has ever equalled in *quality* that which is produced spontaneously from seeds shaken by the hand of nature.

On comparing the natural with planted wood, the difference is found to consist in two particulars only, where the soil has been of the same sort. The natural wood is in general closer in the grain, and consequently harder and deeper in colour; and it has also fewer knots in it.

The reed of wood.—What is called *the grain*, or reed of wood, is formed, for the most part, by a series of circular rings running all round the heart of the tree, as is distinctly seen in a transverse section of the tree; each of these rings contains a harder and softer part, plainly distinguishable from each other, for the most part, by their colour also, which are formed by a series of tubes of different kinds, running parallel to each

other from the bottom towards the top of the tree, that are separated from each other, at a lesser or greater distance, by a softer parenchymatous matter. These tubes, or fibres, are seen in every longitudinal section of the tree, running in parallel stripes, and constitute what is called the reed of the wood. And as one of these rings is added to the circumference of the tree each year of it's growth, and forms the whole increment of the tree for that year, it follows, that the less that increment is, or, in other words, the slower the trees grow, the less will be the breadth of these rings, and, of course, the closer the grain of the wood, and the harder also it will be : for it would seem that the number of tubes produced each year is nearly equal ; but that the quantity of soft parenchymatous matter in which they are imbibed, is augmented in proportion to the quickness of the growth of the tree, which makes the reed both wider, and the general texture softer, than where it grows more slowly.

Knots in wood how produced.—These parallel stripes or reed never are interrupted in coniferous trees, except where a branch springs out from the body of the tree. In that case, wherever a branch intervenes, it forms an interruption to the

direction of the parallel fibres, which, at that place are deflected into the position that the branch assumes, and forming a ring round the pith of that branch, the fibres run parallel with the pith of the branch in it's longitudinal direction.

As these branches spring out from the stem, for the most part in a direction nearly at right angles with the stem of the tree, it follows, that when the wood is sawed into plank longitudinally, the saw, when it crosses one of these branches, must make a transverse section of it, as in the direction of the line of A. B. Fig. 1*st*. This forms the blemish in deal, called *knots*, the appearance of which is seen in Fig. 2*d* [*see the plate at the end of this essay.*]

In regard to these knots, the following particulars are observable; viz. 1*st*, that the size of these varies in deals cut out of the same plank. If a deal were slit down in the direction of the line A. B. Fig: 1*st*, the knot in that deal would consist of no more than *four* concentric rings; but if it had been slit in the direction F. G. it would in that place have consisted of *six* rings, and so it would turn wider and wider, as you receded from the centre of the tree to the circumference, or as long as the branch continued to grow.

Hence, as a necessary corrolary, we must perceive that no *large* knots can ever be found near the heart of the tree, and that very large knots can only be found towards the circumference:

If, by design or accident, a branch be cut over smooth with the surface of the tree, the branch from that moment grows no more: but as the tree advances in growth, by the addition of a new ring each year, it gradually heals over the wound, and from that moment the ligneous fibres run over it parallel to each other, exactly as if no branch had ever been there, as in Fig. 3*d*; so that all the wood which is formed beyond that cut will be perfectly free from knots of any kind.

If the amputation has been made clear over at once, while the branch was still growing, the fibres of the trunk will be joined in continuity with those of the knot, and it thus forms a firm live knot, if the phrase be admitted; but if the branch die, and be suffered to remain adherent to the tree, that branch receives no farther additions; and although the tree continues to advance in size, and surround the branch, yet it has no farther connection with it than contiguity only; and it then forms a *dead* knot. The dead wood, in this case, when the deal is sawed across it on both sides, may be taken out of it as a cork, without

force, and thus leaves a *hole*, in place of a *knot*, in the deal, as is plain by inspection of Fig. 4th, where the knot has continued alive till it reached the dotted line, till which time it received an annual increment, and had it's continuity with the fibres of the wood uninterrupted; but from that period, being dead, it encreased no more, and thus formed a hole in the deal through which it penetrated.

Some corollaries, to be drawn from the physical progress of a tree, might be here noticed, which will explain some very common phenomena in the structure of fir wood. I shall only state a few.

Though every branch, as well as the stem, receives a ring of increment each year, yet as the branches do not encrease in size so fast as the stem, it follows that these rings are closer than those of the stem. And as it is found to be a rule, I believe without exception, that the closer these rings, the harder is the wood, and the redder the colour of it. Hence it invariably happens, that the knots are of a closer grain, redder colour, firmer texture, and more durable quality, than that of the wood itself, though usually more brittle also.

And as these qualities are augmented in proportion to the slowness of the growth of the one part, when compared with the other, it must happen that the smaller the knot is, if situated at the same distance from the heart of the tree, the firmer, and reder, and more durable it will be. These, when the circumstances are adverted to, are obvious corollaries.

The difference between natural and planted wood explained.—By keeping these particulars steadily in view, it will not only be easy to account for the superiority of natural wood over that which has been planted; but, at the same time, we will be led to perceive in what manner artificial plantations of coniferous trees ought to be so managed as to approach as nearly as possible to perfection.

In woods of coniferous trees, the progress, when left to nature, is this. The seeds being strewed very thick upon the ground, the plants, where the surface is favourable, spring up very close upon each other. Being straitened for room, their growth is stinted, and they hold a hard struggle, for some years, which shall get the better of the other. By degrees, the weaker plants are overtopped by the stronger, and die;

but still others struggle for life, and maintain the contest: and so it goes on without interruption during the greatest part of the period of their existence, or at least till they have attained a great height,—when the boughs of the most vigorous trees, spreading out above, overtop all those that are near; and thus a sufficient space is allowed for these to remain unmolested till they attain their full size.

During this long struggle for life, the progress is greatly retarded; so that their growth is slow, and the fibres of the wood of course very close and hard. The side branches, too, having no room to spread abroad, are kept weak and puny, and are soon suffocated by those above them, and die. In consequence of the agitation by winds, and the constant rubbing of the trees around, these dead branches soon are broken off and fall to the ground, before the stem has advanced far around the dead stump. It is no sooner rubbed off, than the bark begins to close over it. The stem thus becomes clear of branches and smooth, and all the wood that afterwards grows over it, is fine and free from knots. Hence it is that deal, towards the heart of the tree, is always much fuller of knots than nearer the circumference, though these internal knots, for the rea-

sons above given, will always be of a smaller size than those that reach near to the outside of the tree.

In artificial plantations we follow an opposite course. Anxious to admire the progress of our trees, no measures are adopted for retarding their progress, at an early period, but rather the reverse : and were we even inclined to follow the progress of nature, the very expence of procuring and putting into the ground the plants, amounting to many millions on an acre, would prove a decisive bar to such enterprizes. The young trees are of course planted at a great distance from each other, and are encouraged to grow as quickly as possible, and thus to make the wood coarse in the grain, and soft. The branches, too, having room to spread wide on every side, advance with great luxuriance, and continue to grow till they attain a large size, and of course render the deal full of large and unsightly knots throughout it's whole extent. Where utility and profit are aimed at, our attention should be directed to remedy these evils as much as the circumstances will admit.

To effect this, no method appears to me so easy to be reduced to practice as the following.

How to make planted wood resemble natural grown trees.—Though we cannot afford to make our plantations as thick as nature does, we ought to approach as near it as prudence will admit; and, I am satisfied, that by planting larches at two feet distance, the benefits to be derived from the practice will do more than repay all expences attending it. Perhaps it might be still better, if the plants were placed at no more than 18 inches apart; but not being *certain* of this fact, I shall, for the present, suppose, that two feet is admitted to be the most eligible distance (*p*).

Plantations should be made very thick.—At two feet apart, an English statute acre will contain 10,890 plants. (A Scotch acre 12,960 plants, which is about 10,000, at the rate of 12 score *per* hundred.) For the conveniency of thinning, and the other operations to be after mentioned, these ought all to be planted in rows, where the nature of the ground will admit of it. To do this, a small line, measuring sixty yards in length, ought to have knots tied upon it, at every length of two feet, and a feather, a coloured rag, or other distinguishable object, stuck into each knot. This will mark the place where the trees should be put down. And if two men be employed,

after stretching the line, at a proper measured distance from the last, each of the men begins at the end of the line, and putting down a plant at each mark, work till they meet near the middle, when they should turn back, shift the line, and begin anew ; and so on they may advance till the whole field be planted.

The trees should be planted out while very young.—It is unnecessary to enter into minute details on this head. I would only beg leave to observe, that many advantages result from planting very small and young plants, in preference to those that are of a larger size. And this requires to be particularly adverted to, where they are to be planted so close as is here recommended. If the ground has been in tillage, it will be a great advantage to have it neatly plowed over, and harrowed before winter. At any rate, it ought to be laid dry, so as that no stagnant water remains on the surface, at any time of the year, if possible. With this view, the water-furrows, if it be plowed, and the soil retentive, should be neatly cleared out after harrowing. No weed is so destructive to young plantations as grass : for where that abounds, if the trees be planted, while of a small size, they will be infallibly over-

topped by it and choaked; and if they be planted large, they seldom succeed well; many of them die; and it is long before the survivors take a full growth: so that, considering all these circumstances, and the expence of putting in such large plants, where the sward is tough, it will be more adviseable, in every such case, to cause the surface to be pared by the spade before planting; and these parings be either carried wholly off the field where the thin surface paring is wanted; or where that is not the case, by turning it over flat upon it's back with the grassy side undermost; and, in this case, if a little more than half the surface be turned over, it will cover the part upon which it is laid, so as to prevent the grass from growing up for some years; but unless it wholly overlays the sward, the grass will advance with great luxuriance round the edges, so as to render the paring of much less benefit than it would have been. Where the surface is smooth, and not too steep, or incommoded by stones, a plough might easily be contrived to perform this necessary operation.

Plantations must be compleatly inclosed and planted in squares.—We shall suppose the whole field to be thus prepared and *compleatly inclosed*,

(for unless this is to be done in the most perfect manner, so as to guard against all intrusions, it is wrong to attempt ever to plant trees,) the plants will stand in regular squares, two feet apart, as in Fig. 5th.

In this state they may remain six, eight, ten, or twelve years, according to the richness of the soil, or the purposes for which the thinnings are wanted, when they should be thinned for the *first* time. The branches will in general intermingle with each other in the second or third year after planting; after which period they will give and receive mutual support, and advance for a time with vigour.

First thinning, how to be made.—The first thinning ought not to be too long delayed, lest the tops, by growing too close, should be so much smothered as to occasion a hurtful gap when the thinnings are taken away.

At the first thinning, one row should be taken clean out, so as to leave the plants there four feet apart; and allowing three rows to remain entire, take out the fourth, as in Fig. 6th; and so on over the whole field. By this procedure, though the row on each side the open will lose its support on *one* side, its branches, being still

intermixed with those on the *three* other sides, will give it sufficient support. It is necessary to cut out a row compleatly, to admit of trailing out the long spires together with their tops, which could not otherwise be done.

The second thinning.—In consequence of this open, the branches above will be permitted to grow more freely over the *open*; and in this state they should be suffered to remain till they there intermingle once more, when they should receive the second thinning, by taking out the middle row that was left at the former thinning, when the plants will stand as in Fig. 7th, in rows four feet apart, and two feet from each other in the rows. By this means, each tree is supported by those on each side of it *in the row*, whose branches are closely intermingled, as well as by those on one side, where first opened; so that still they are open only upon *one* side, while they receive support on *three* others.

The third thinning.—When the branches are closed in the last made open, the third thinning may be given by then cutting out every fourth row *crosswise*, exactly as was done in the oppo-

site direction in the first thinning, when the plants will stand as in Fig. 8th.

The fourth thinning.—After a proper interval of time, the fourth thinning may be given, by taking out the cross row that was left between the two contiguous to it. And now the whole trees in the plantation are once more reduced to squares, standing at 4 feet apart, as at Fig. 9th.

There will now remain at the rate of 2722 trees *per* acre: so that 8168 plants have been taken out during these successive thinnings.

Benefits to be derived from these thinnings.—This is the distance at which most people would have chosen to plant their trees at the beginning; but, in consequence of the management recommended, many benefits will accrue, independent of the profit to be derived from the sale of the thinnings, which, in most situations, will be an object worth the attending to.

In the *first* place, the plants, by sooner closing upon each other, are for a shorter time after planting distressed by the wind, and therefore advance more kindly, and rise cleaner and straighter in the stem.

Secondly, The under branches, by being quickly suffocated, sooner die and are rubbed off, and never attain to a size to make large knots, as they must infallibly do, if planted at first so far apart. The stems are thus rendered to approach in some measure to the straight cleanness of natural woods. And if attention were bestowed to prune off the under branches, as they gradually begin to decay, especially of the few trees that are intended ultimately to remain for timber, the wood would be rendered even cleaner than the greatest part of that which is got from natural woods: and,

Lastly, By mutually checking the rank growth of each other, the wood will be rendered closer and finer in the grain than it otherwise could have been; and this not only without any loss, but with great profit to the owner; as, instead of large dangling branches, which are of little use in any situation, he would obtain upright spires from the weedings, which, in every situation, may be converted to some useful purpose. And, in many cases, might be a source of great emolument.

Farther thinnings, how to be conducted.—After a proper interval, the trees might be thinned, after the same manner as has been described, till

they were gradually reduced once more to stand in squares, at *eight* feet apart, which is perhaps the greatest distance that ever should be allowed to trees of this kind: for, by being thus circumstanced, their small tops would mix and support each other: they would have sufficient room to grow without starving; and by stinting each other in respect to nourishment, though each individual tree would advance more slowly than it would do if allowed more room; yet there can be no doubt that a greater quantity of wood, *upon the whole*, might be obtained from the same extent of ground in an equal length of time, than if it had been thinner; and there is reason to believe the wood would be much finer in quality.

Yet here, as in regard to the proper degree of thinning, I have had no experience of the fact: I reason only upon probability, and therefore am far from speaking decisively. Should experience show that a greater degree of thinning may be given to these plantations with safety, doubtless the effects of it, in an economical point of view, should be tried; and that practice ultimately adhered to, which shall promise, on the whole, to be most beneficial. If thinning is to be at all adopted at this advanced age, it will require to be done with still more precautions, in order to

insure mutual support, than when the plants are of a more humble growth; because the wind will have much more hold upon their tops, and will act with a more powerful lever. When plantations of firs have been suffered to stand close a long while, and then suddenly thinned, without due attention to these circumstances, they are seen often to die, before they have attained an age at which their wood can be applied to any very useful purpose. In this point of view, these cautions and the gradual thinning, recommended above, to commence at a very early period, and never to be long interrupted, will be found to be highly beneficial, and ought not to be overlooked.

At eight feet apart, an acre will contain 680 trees: so that the trees cut out during the second process of thinning, have amounted to the number of 2042.

If the thinning be begun from the sixth to the tenth year from the time of planting, as circumstances shall indicate, the whole may be completed thus far by the thirtieth or fortieth year of their growth, during which time there will have been sold 10,210 spars from 15 to 50 feet in height, and proportional thickness, from each acre. If it be thought adviseable to continue the thinning farther, after this period, no whole

rows ought ever to be cut out any where, but only a single tree here and there, so as not to deprive those around it of support too much at once. In this way, perhaps, the thinning might admit of being safely continued for an indefinite number of years, where the situation is not very much exposed.

Hints respecting the profit to be derived from these plantations.—I might now make a calculation with a view to shew what might be the amount of the profits to be derived from this practice; but I have a great aversion to calculations of this kind: for as all the data must be mere hypothetical assumptions, it is the easiest matter imaginable for the calculator, in assuming a little more or less of these data, to bring out the result precisely to his own wish, without any striking obvious fallacy on his part. It is no part of my wish to mislead the reader, but merely to inform him to the best of my power. From the facts already stated in different parts of this disquisition, every reader may, if he pleases, make out from these a calculation adapted to his own situation; for every person must be aware that more than four times as much money may be drawn for the same quantity of materials of this sort, in

one part of the country, than in another. Doubtless, if I had not thought that, after making a sufficient allowance for every unobserved contingency, the prospect of advantage to be derived from this practice, where adopted, was sufficiently inviting to encourage proprietors boldly to venture upon it, on a pretty extensive scale, in most situations, I should, not have taken the trouble to enter so fully into the investigation on this occasion. Nor shall I add more on this head, except briefly to observe, that if we shall suppose that the sale of 10,210 spars, on an average suppose of 30 feet in length, from one acre, would be sufficient to defray all the expences incurred on making the plantation and upholding it, which will not, I suppose, be deemed an unreasonable supposition in almost any situation:—and that each tree, at 50 years growth, instead of containing 360 feet of wood, as those at Dunkeld are known to do, —these trees should, at the same age, measure no more than 70 feet each, which is less than one fifth part of the others: in that case the 680 trees on an acre would at fifty years of age, contain 47,600 cubic feet of timber, which, at one shilling *per* foot, would amount to 2380*l.*, from which, if you deduct the rent, which we shall for the present case suppose to be 5 shillings *per*

acre, which, for 50 years is 10l. and interest for payment withheld, say 15l. more, in all 25l., there will remain 2355l. free profit; without taking into the account any thing at all for the article balsam, or any other contingency. The conclusion we are forced to draw from these facts, which do not seem liable to any valid objection, are sufficiently inviting, were more than three fourths of the sum to be deducted for unforeseen contingencies, as to be a sufficient inducement, one would think, for any reasonable person, whose situation admits of it, without throwing himself into embarrassing circumstances, to proceed without hesitation in this improvement. I surely can have no motive for inducing any person to attempt it, except the conviction that, should such plantations become general, the comforts of the lower ranks of people in this island would be much augmented; the general industry of the people greatly excited; and the wealth of individuals, as well as the general prosperity, receive by that means a very great addition. It is now about twenty-two years since I first endeavoured to turn the attention of my countrymen in Scotland towards this useful tree, by some observations in a popular work that had then a very general circulation through Scotland. [Afterwards pub-

lished by itself, in a volume, called, Letters on planting timber trees, by *Agricola*.] It then attracted notice, and has, I doubt not, had its effect, along with other causes, greatly to extend its culture. At that time I think it would have been then a high estimate, to suppose that 50 thousand larch trees were annually reared in Scotland. At the present moment, the demand for that tree is so much encreased, that from the nearest estimate I can make, one nurseryman in Edinburgh alone has raised this season above five millions of larch trees; and I do not suppose that, taking all Scotland together, there are not fewer than twenty extensive public, besides a great many private nurseries, all of which are chiefly stocked with larches. [The Duke of Athole alone has been in the practice, for many years past, of rearing himself, and planting out from his own nurseries, at the rate of one hundred thousand larches *per annum*, on an average of years. I myself have planted out above 200 thousand larches on an average of the last three years, in Aberdeenshire.] This affords a happy prospect of the benefits that the northern parts of this island will in time derive from this article. I am sorry to observe how comparatively few the plantations of larches are in England; and I also re-

gret to think that, among the numerous plantations hitherto made in Scotland, there is so little prospect of obtaining much fine clean wood. Thick unmixed plantations of larches are but just beginning to come into use.

Sufficient fences necessary to protect plantations.—The necessity of protecting trees of all kinds from the intrusion of beasts, especially when young, is more generally admitted in theory than practice. I consider it, myself, as a *fine qua non* for rearing healthy trees of any kind; but in regard to the larch, it becomes so indispensibly necessary, that I should certainly dissuade any person from planting trees of this sort, unless he were determined, at all events, to have the ground so compleatly fenced at all times, as effectually to prevent any intrusion of domestic animals; for without this preliminary, he will reap neither pleasure nor profit from the enterprise. The larch, though it will sometimes recover its top, when the tender twigs of it are cut over, and admits of being cut in the side by scissars better than any other coniferous tree known in this country, yet is extremely impatient of wounds in its *bark*; so that a touch there, which would scarcely be felt on any other tree, will make a

larix perish entirely. For this reason it requires not only to be thoroughly fenced while young, but carefully protected even after it has attained a considerable magnitude. For this, among other reasons, I should prefer leaving the woods thick, even at an advanced age, to thinning them considerably: for thus grafts will be prevented from growing below, and no temptation be given for putting cattle or other animals among the trees, which might injure their bark.

Large inclosures recommended.—In order to diminish the expence of plantations, the inclosures should be made as large as the circumstances of the case will admit: for the larger these are, the smaller, proportionally, is the expence of the plantation. This is a proposition so plain as to stand in need of no illustration.

Stone walls.—The nature of the fence must in many cases be determined by circumstances: where stones can be got very good, and at a small expence, walls may be made a very good defence against *cattle* for a time; but light bodied *sheep* will readily overleap them. Where larch spars are already to be had in the neighbourhood, a low rail of a foot, or 15 inches in height, form-

ed of the top twigs stuck into the coping, slanting outwards, will prove a perfect defence for many years. Where this is wanting, the wall can never be relied upon.

Ditch and bank fence.—In level situations, where the ground can be easily dug, a ditch and bank may be reared, as in Fig. 10, at a small expence. B, C, is raised of sod four feet high, C, E, D, is a ditch four feet wide at top, three feet deep, and about nine inches wide at bottom. The earth taken from the ditch forms the bank C, B, A, the sod wall facing outward: A being the inner area for the plantation. This mound will not, in it's present state, be an adequate fence against sheep; nor even for any length of time against cattle; but by adopting the following precautions, it will become in two years' time a perfect defence against both.

Furze, it's use in fencing.—If there be sward upon the surface of the ground D, take off a sod from it, one foot at least in breadth, which may be employed in raising the bank B; and in it's place lay some of the loose earth that comes out of the ditch; lay also some of that loose earth upon the leget C, which ought to be left from

6 to 9 inches broad for that purpose, so as to cover the sward there. When the bank is finished, draw a small drill with a hoe all along at D, six inches back from the edge of the ditch, among the loose earth, and another drill at C, close by the bottom of the bank; sprinkle seeds of the common whin or furze, (*Ulex Europæus*,) pretty thick in both these drills, and afterwards cover them carefully over with earth. These seeds, if good, will come up readily the following spring; but as it is of much consequence that no blanks should be in either of these drills, they ought to be carefully examined along their whole length, as soon as the plants appear, and the wants supplied immediately with fresh seeds, so as to prevent gaps: another row of furze seeds should be sown upon the top of the bank B, and the work is completed.

The whins at C, D, and B, will push out with vigour, so as in most cases to attain the height of one foot each before autumn. In the year following, they will advance faster, and will effectually prevent sheep from jumping over; for they dare not come near the edge of the ditch to take their leap, and the bushes on the top at B present a formidable scar in their face. And as to cattle, which, if allowed to go in the ditch, would

gradually pull down the bank with their horns, if they should at any time get into the ditch; the two rows of furze nearly meeting upon their sides would incommode and frighten them so much, as to induce them to get out of it as soon as possible, which they could only do by coming to the low side D. If they once got into that situation, they would feel it so disagreeable, as to guard carefully against coming there again.

The larix itself, it's uses in fencing.—To preserve the furze from getting open at the bottom, one of the rows ought always to be cut over close by the roots each year; 1st, the row C, leaving D, and B; 2^d, the row D, leaving C, and B; and 3^d, B, leaving C, and D; and so on alternately. In this way the fence may be kept up for the space of ten or twelve years. After that period, the mound will in general crumble down of itself, and cannot be relied on as a sufficient fence. To prepare for this evil, which may be expected, the row of trees next the bank should be carefully preserved all around, and if planted originally at no more than one foot asunder, leaving an interval of three or four feet within, the trees will rise up by way of hedge, as at F, fig. 11th, which, if made of larch, may be cut

in the sides, if thought proper, by sheers, so as to thicken it quite down to the bottom. This kind of hedge may be soon made an effectual defence against animals of any sort, by the following contrivance. At the time the larches are planted, plant a sweetbriar between each tree. This plant grows freely. To make it still more luxuriant, let it be cut over by hedge sheers *close* by the ground, the first or second autumn after planting, the twigs to be drawn out and laid to a side. It will send out very luxuriant shoots next season, which, intermingling with the larches, now meeting each other, will push through the interval, and by it's prickles render them difficult to be approached. The intermingled twigs of the larch and eglantine may be next winter pruned in the sides by the hedge sheers, which will make them grow closer. Let the eglantine be cut over close by the ground once more, but allow the shoots to retain their place; other shoots will spring up from their stems with vigour next season, and intermingle with the live larch and dead branches of the eglantine. The hedge may be dressed in the same manner next winter. The dead prickly stems will thus be encreased, and close all crannies. Through these will spring up fresh shoots of eglantine, and interlace the whole

together. By continuing this mode of dressing, and renewing it from time to time, as occasion may require, it will become an impenetrable fence against any animal: so that when the bank fails, cross rails, if necessary, being fixed to these living supports, will form a perfect fence, that may be kept up with little expence as long as it can be wanted.

This fence may be compleated at the price of two-pence *per* yard, in most situations. In some places, it may be less; in others, perhaps, a little more; but, in every case, where the nature of the ground admits of it, it is a very cheap fence for this purpose, and will prove effectual.

The bramble, it's uses in fencing.—A fence of still greater value, and which is equally applicable with the above in soft soils, and to those that are harder in rocky and hilly countries may be thus constructed.

Let a bank be raised on the inner side of a ditch, where it can be dug similar to the former, and faced with stones, where these can be easily had, of a good binding quality; or, where the stones are small, or rounded, or fewer in number than wanted, they may be laid in alternate rows with fods. This is a mode of fencing practised

much about Caermarthen in Wales, and is found to form a compact and durable facing. Or where no stones can be had, the facing may be entirely of sod. The backing to be made of earth, dug either from the ditch, if on a level, or scraped from without in the best way it can be got, if upon a slope, or taken from behind where it can be easiest had; so as to raise the wall with it's ditch from four to five feet high. Upon the top of this bank, and about one foot backwards from it's edge, plant a row of *bramble* plants, at about six inches apart all around. These may sometimes be picked up from the common; but, in this case, be sure to take none but young plants newly grown and well rooted: all others should be rejected: for it is of the utmost consequence that the hedge should come away equally in all it's parts, so as not to leave a single gap in any place. To insure this in the most effectual manner, I should prefer in general plants reared from seeds, to all others. And where many fences of this kind are to be made, seedlings will be not only the best, but the cheapest plants. For obtaining these, the berries may be collected when ripe; the juice squeezed out; the mark, containing the seeds, dried and kept till the spring; if then sown they will come up readily, as I should

suppose, and will be of a proper size for planting out the winter after. Great care should be taken to examine the plants the first season after planting, and to supply every want that may be perceived; for if this be not done, the hedge will never afterwards be equal and uniform throughout its whole extent. I am induced to take notice of this circumstance so pointedly, from observing that culpable carelessness, in regard to this essential circumstance, is observable almost universally, which is the chief cause of that raggedness in hedges that every where prevails.

It is perhaps scarcely necessary to observe, that in places where the ground without rises higher than that within the fence, it will be necessary to rear the bank to a greater height than elsewhere; and there also it will be proper to plant a dead fence of black thorns, or other brush wood, upon the top of the fence: if that be done at the time the brambles are planted, these live plants may be intermixed with the dead fence without detriment to them, but rather the reverse: if the ground rise considerably, and if sheep abound in that neighbourhood, it will be proper also in these places to dig, or otherwise bare from grass the surface of the ground, for three or four feet on the outside of the ditch, and sow whin seeds upon

it, which will quickly grow up, and effectually prevent the sheep from getting there free footing to leap over the fence from the higher ground.

If the hedge has been planted with due care, it will come away with great luxuriance, and send forth annually a great profusion of luxuriant shoots, which rising upwards, and spreading out on both sides, forms a close matted coping of spiny plants all over, that will effectually prevent the intrusion either of men or other animals. To prevent the plants from establishing themselves at the bottom of the bank, it will be necessary to send a person each year, in the month of August, round the fence, with a sharp light hedge-bill, merely to scutch off the tops of all such dangling shoots as discover a tendency to reach near to the bottom of the bank; for if they be allowed to touch the ground with their points, these points, wherever they touch, will directly strike root, and thus establish a new plant at the bottom, or in the bank itself, if of sod; from which others will spread around, to the great detriment of sheep, if they be allowed to come there, and to the hurt of the pastures, by whatever animals they are to be consumed; by this very trifling attention, this evil will be effectually obviated, [If any plants

are observed to have struck roots in the sod wall, they should be pulled out, as observed.] and the fences kept as neat as could be desired, at an expence next to nothing: for a man could do all that is required, nearly as soon as he could barely walk round the inclosure.

The bramble resembles the rasp-berry in the mode of it's growth, which differs from that of all other plants I know. Every year it sends out a great number of shoots from the bottom, which push out to the whole length they ever attain during the first year. The shoots of this season consist of single unbranching stems, unless where they have been accidentally cut over, when they become forked. The next season, these stems set out a great many fruit-bearing branches, along their whole length, which flower and perfect their seeds, while a new set of stems are pushing from the bottom to become seed-bearers next season. After perfecting their seeds, the whole stem that bore them, with all it's branches, dies. This is the natural and unvarying progression observed in the growth of this plant: so that a hedge of the kind I propose, will contain at all times three distinct kinds of shoots, intermixed with and crossing each other in all directions: viz. *first*, the dead shoots; *second*, those that carry fruit;

and, *third*, those that are pushing forward in their longitudinal growth; and as all of these are covered with strong spines, they form, upon the whole, an impenetrable matting, when confined within proper bounds.

I have never yet seen any care bestowed to effect this last named purpose, and from this circumstance alone, the great utility of the bramble as a fence-shrub, has never been properly adverted to. When neglected, it rambles to such a degree, as to become a very unfightly plant, and a mere cumberer of the ground. To the qualities it possesses in common with the rasp-berry, must be added that singular peculiarity the bramble alone possesses, of a faculty to strike roots at the point of the shoots of one year's growth; and this tendency is so strong, that wherever these points are allowed to lie upon the ground, they will infallibly take root in a very short time, after which time each of these becomes a new plant, totally unconnected with the former, unless by intermingling of branches; and thus they ramble wide, if neglected, and may quickly over-run a vast extent of surface. But what is not a little remarkable in this case, is, that no other part of the stem, except the point of the shoot alone, will strike root, even if it were laid into the

ground: nor will any one of the fruit-bearing branches ever take root in any circumstances. Hence, then, the only thing required of the husbandman, in this case, is to take care that none of the dangling young shoots shall ever be allowed to rest upon the ground, on the outside of his fence; and he has nothing to fear. The slight dressing I have recommended, which, if never omitted for one year, will be the easiest thing imaginable; (because nothing but the tender shoots of that year require to be cut, which may be done by the slightest touch:) but should it be omitted for one season, not only would there be great risk that many young plants would by that time have established themselves, but also the old shoots of the former year being become tough and hardened, would be with great difficulty cut through; so as to prove a very troublesome operation. Never could the old adage, that "a stitch in time saves nine," be better applied than in the present case.

A good fence of this kind may be reared, in most situations, for a price not exceeding from two pence to three pence *per* yard: for a facing is only required upon one side.

Sweet-briar may be substituted in place of the bramble in a fence of this kind, if thought proper,

as it will grow very freely in this situation; but this is by no means so eligible as the bramble: for unless the sweet-briar be often cut over by the roots, it is apt to get naked below, ragged, and unfightly, if without support from other plants; and if other plants be placed there, they grow poorly, from want of abundant nourishment. In exposed situations, too, the wind gets hold of the tops of these shrubs, and by acting on these as a lever, is apt to pull down the whole bank, unless where it is made very strong. The bramble is liable to none of these objections; and it seems to be the very plant fitted by nature for forming that close netted prickly coping, which was wanted alike to prevent animals from tearing down this comparatively tender bank, and to preserve it from the levelling power of the air, and other external injuries. It is the business of man to avail himself of the blessings that nature has bountifully put within his reach.

Other kinds of fences might be named, equally cheap and efficacious, for low and fertile fields, as those are for upland barren soils; but these require not here to be specified.

Conclusion.—I will not enlarge upon the advantages that might be derived by private indivi-

duals, or the benefits that would result to the community at large, were a large proportion of the waste lands of the kingdom thus appropriated; as these are very obvious. Whether this shall take place, or not, I shall at least have the satisfaction, for my part, to reflect that I have not been wanting in my duty in this respect.

The cedar of Bermuda is well known to be the most valuable wood for building light and durable vessels, that have been yet built in any European settlement out of India. It grows quickly in Bermuda, and, by some experiments that were made by the late Duncan Stewart Esq. of Ardheil, who lived sometime in these islands, the seeds were found to grow, and the tree to thrive in this country. What are the peculiarities of soil and exposure that will best suit that tree, have not yet been ascertained; far less is it known if it will grow properly in waste and barren grounds. This ought to be fairly tried. With that view, it is my intention to order a considerable quantity of the seeds home; and I shall not fail to communicate to the public the result of these trials, should life be spared till that shall be known.

ESSAY THIRD.

HINTS

ON

THE ECONOMICAL CONSUMPTION

OF THE

PRODUCE OF A FARM.

*Mulum adbut restat operis, multumque restabit, nec ulli nato post
mille secula precludetur occasio aliquid adjiciendi.*

LINNÆUS.

ESSAY THIRD.

HINTS ON THE ECONOMICAL CONSUMPTION OF THE PRODUCE OF A FARM.

No better proof can be adduced of the little progress that has been as yet made in the practice of agriculture in Britain, than that even the title of this chapter, nor any thing of a similar tendency, has never found a place in any treatise that has yet been published on the subject of rural economics ; though it will be found to be a subject of very primary importance.

It may be admitted as a maxim, that agriculture can never be said to have been carried to it's ultimate degree of perfection, so long as there is to be found one inch of ground that could be made to yield a single grain of greater or more valuable produce : so long as a single ounce of vegetable matter is allowed to go to waste, or that has not been applied towards the sustenance of some useful animal, in the way in which it could produce it's most beneficial effect : and while a single particle of dung or other ma-

nure is suffered to be misapplied, or so employed as not to afford the greatest possible resource it is capable of yielding, for the reproduction of additional crops of the most valuable kinds. That the highest degree of possible perfection should, in every case, be attained, is not to be expected in this imperfect state: but the nearer we approximate to it the better; and the more steadily we keep these objects in view, and the more strenuous our exertions are to attain them, we shall doubtless approach the nearer to these desirable attainments.

So far are these objects, however, from being steadily held in view, in the present age, that one who attends to general practice in Britain, would be induced to believe they were scarcely ever adverted to, unless by a very few persons, and in regard to a small number of particulars only. Economy in the expenditure of the produce of a farm, like economy in the expenditure of capital in family affairs, seems indeed to be despised by many men, as indicating *poverty* of spirit, rather than wisdom, and is therefore studiously, as it should seem, avoided. There are, however, a few individuals, who have showed themselves to be above these prejudices, and who have not been ashamed to attempt to make

some progress in different departments referable to this head.

Economical arrangements, were the subject to be considered in it's utmost extent, as affecting the whole management of a farm, would take a much wider sweep than that to which I mean to confine myself in the present disquisition; which is solely meant to relate to the consumption of the crude produce of a farm by animals: nor can I pretend, in what follows in this essay, to give absolute directions to the farmer what he ought to do, even on that part of the subject I shall now bring under view. At the mere outset, in a business of such magnitude and intricacy, the person who first attempts to open up the view, can do little more than act in the humble station of a pioneer, who clears away a few obstructions that may enable others, with less labour, to penetrate farther than he has done: so that what follows under this head can only be considered as an exploratory excursion into an unknown region, from which only a very imperfect idea can be given of the subject. Craving, then, the indulgence of the reader, for unavoidable defects, and his friendly correction of those involuntary errors that his situation may enable him to discover, I proceed to suggest such hints

as have occurred to me on a slight view of this interesting subject.

Much dung is wasted under the common practice of pasturage.—It is stated, in the agricultural survey of Gloucestershire, that one acre of rye-grass, which had been sowed from Michaelmas to May, kept nine ewes and lambs *one month*. We may safely say that the produce of the same field, from May till Michaelmas, would have been double to that it yielded during the winter half year; consequently it could have sustained eighteen ewes and lambs *one month*. At this rate the acre of ground, taking the whole year round, would have afforded food for twenty-seven ewes and lambs for *one month*. These are large sheep, averaging about 25 pounds *per quarter*.

It is stated, in the survey of Wiltshire, that 500 such ewes and lambs are sufficient to dung an acre each day when folded upon it: at that rate, 27 of them should dung an acre in a little less than nineteen days; consequently, in thirty days, somewhat better than half an acre more. (q) Hence it follows, that if none of this dung were suffered to go to waste, *an acre* of good land laid down to grass, in high order, should afford as much dung as would be suffi-

cient to dress *an acre and a half* of other land each year.

Again,—It is stated in the agricultural account of Suffolk, that the rich marsh lands there keep at the rate of six sheep for seven summer months, and four for the five winter months, *per acre*; that is, a little more than five sheep on an average *per acre* throughout the whole year. These are very large sheep, of which 800 would be equal to the 500 ewes and lambs above mentioned, and consequently would be sufficient to dung an acre in one day. But 5 times 365 makes 1825, the number of sheep kept for *one* day. At this rate, one acre of these rich grass lands would afford as much dung, in the course of one year, as should be sufficient to dung somewhat more than *two acres and a quarter* each year, if husbanded with due economy.

As the sheep in neither of these cases are folded, the dung is suffered to drop in a scattered manner over the pastures, throughout the whole year. In this manner, the influence of the dung must either be nothing, or it must produce *certain* effects upon the grass. If the last, what will these effects be?

It is well known that when sheep are folded upon grass ground, so as to deposit their dung

upon it in considerable quantities all *about one time*, as in folding, the effect is, that a flush of grafs is quickly produced over it's whole surface, which is much more luxuriant and abundant than it would have been, had it not received this dressing. But it is equally well known, that the animals, whose dung has occasioned that flush of grafs, nauseate it; nor can they be brought to taste it, unless they be compelled through hunger to do so; although animals of another kind are seen to eat that kind of grafs, [called in some places *gofk*, in other places *toth*,] not only without reluctance, but even with avidity.

The extra flush of grafs raised on the two acres and a quarter, that might be thus manured by the sheep fed on one acre, would be sufficient, on a moderate computation, to keep at the rate of two sheep *per* acre. By consequence, the extra grafs produced by the dung of the sheep kept on one acre of this rich grafs land, would be sufficient to keep four sheep and a half. But to keep within bounds, say *three* sheep only could be kept by the grafs produced from the dung of the sheep fed on one acre.

If the dung be supposed to have the same effect in producing extra grafs, when dropped

from the animals as they pasture on the field, as it has when laid upon ground closely, by means of folding, it must follow from these premises, that as much grass will grow from that dung upon each acre as would feed three sheep. But as the sheep will not eat this kind of grass without constraint, the ground must either be so hard stocked as to compel them, through hunger, to eat that nauseous food, or that portion of the grass which is produced by the dung, will be suffered to run to waste; so that, in either case, a considerable loss must be sustained by the owner.

This loss may indeed be avoided, in as far as respects the consuming of the grass only, by mixing different kinds of stock on the same field, while in pasture. For if these animals can be made to associate together, so as not to disturb each other in the field, the one set of animals will eat up the rank grass produced from the dung of the others, and thus the whole will be eaten up without waste. This practice is indeed sometimes adopted in Suffolk to a certain degree, where the farmers are in use to put among their sheep a certain proportion of calves or horses, which, in some measure, answer this end. But as the general practice there is to stock with sheep only, the loss to the stock itself, which must

arise from this cause, would be very great, were it not obviated by a circumstance which indeed diminishes this evil, though this is in consequence of it's producing another evil of nearly an equal magnitude.

If the dung, which is scattered about on the field, in small quantities, as it drops from the animals when pasturing upon it, were supposed to be incapable, in that state, of producing any sensible effect as a manure : or if that effect were very inconsiderable, in comparison of what it would otherwise have been, if applied all at one time, as in folding ; in either of these cases, the nauseating quality of the grass would not be experienced by the animals ; or in such a degree only, as not to prove considerably hurtful to them : for, in this case, the dung proving inert, it would do little or no service to the ground, and, in consequence of that, would prove not in any sensible degree hurtful to the feeding of the sheep.

That the above supposition is literally true, seems to be proved by the very fact which gave rise to these observations. If the dung thus dropped produced a melioration in any degree proportionate to what it would have done if collected together, as in folding, it's effects must

have been extremely obvious in two respects; *first*, in augmenting the quantity of grafs produced on the field; and, *second*, in encreasing it's nuseating quality; neither of which, at present, are very obviously perceptible.

In regard to the *first* particular. Every person knows that if a dunging, equal to more than double what is given by a good folding, were laid upon even ordinary grafs ground, it would at once make the produce nearly equal to that of the rich grafs lands in question. And though it be true, that the effect of such a dressing upon poor ground, would not be equally perceptible during the second year as the first, yet it would still be very considerable, infomuch that, although no other dunging were given to it, and the crops were constantly cut and carried off from the field, it would not return to it's former state, but would continue to afford much better crops than before it received the dressing, even for the third, and many succeeding crops. If the same dunging, then, were annually repeated, and if a similar effect were to result from each repetition, the quantity of produce must go on continually augmenting in a very rapid degree from year to year. But as no such rapid melioration is here perceived, we are forced to con-

clude, that the dung which is *thus* applied produces not the effect it might, under good management, be made to do; and that consequently an unnecessary waste is thus sustained.

If it should be alledged, that when land is once brought to a certain degree of productiveness, it can be made to yield no more produce, were it to be dunged ever so often; and that it's richness could not be augmented even by folding itself, no more than it is observed to be by pasturing upon such land;—the want of economy, in suffering the dung to be thus applied, would be even perhaps still more obvious than in the case before stated. For if the dung produces *there* no good effect whatever, there can be no doubt that it would produce a very powerful effect, if properly applied to ground of a poorer quality: so long, then, as such poor ground is to be found, those who suffer their dung to be so applied, must be held guilty of very great mismanagement, and of course should make haste to correct it.

The other circumstance above noticed is a corroborative evidence, that the dung thus laid on the field is allowed to waste itself in a great measure without effect: for had the nauseating quality of the grafs been *nearly* as great as we know

it must have been, if such a proportion of the grafs had been forced by the dung of the animal which is set to consume it, this dislike in these creatures must have been so great as to be at once perceptible to every person ; and must have *compelled* the farmers *universally* to adopt strong and decisive measures to guard against it : but as no such peculiarity is generally recognised, we are forced to conclude that, if it does exist at all, it is felt but in a very inconsiderable degree ; and consequently that the great quantity of dung which is dropped upon these fields, operates not upon them in any sensible degree as a manure.

If these observations be well founded, what an amazing waste is sustained, through the whole nation, by the loss of the dung that is thus uselessly scattered on the surface of pasture fields every where !

I am aware of the prejudice that is very generally entertained in favour of the benefits that grafs land derives from the dung which is dropped by the animals that pasture upon it. But although I have searched diligently for a fact, or an argument grounded upon facts, to support this opinion, I am forced to declare that I have not been able to find one in support of it ; but,

on the contrary, many, besides those above stated, which militate against it. I am therefore compelled to rank this as one of that numerous class of opinions which have been at first casually adopted, and afterwards cherished, by a prejudice derived from habit rather than from reasoning of any sort. For such opinions I entertain no undue respect, and sincerely wish that the foundations of them were in all cases diligently enquired into.

Had this opinion been well founded, it must necessarily have happened, that, in every case where grass land has been long pastured upon, without folding, the quantity of it's annual produce must have been sensibly augmented. That this has not been the case, we need only to open our eyes to be convinced of. It is only necessary to notice the immense numbers of poor grass fields in every part of this kingdom, which have been pastured from year to year without interruption, perhaps for ages past, and which discover not the smallest tendency to melioration of any sort, whether the quantity of produce within the utmost stretch of the memory of man, or the rent that has been paid for them, [the alteration in the value of money being adverted to,] be considered as the standard. I myself

know many fields which, under certain circumstances, have grown evidently less productive than before, though perpetually pastured upon. But as these cases are not perhaps so common in England as in Scotland, I shall not farther insist upon them here. The forest of Dartmoor in Devonshire, and other such extensive moors of a barren nature, in many other parts of England, though every year stocked in summer with more beasts than the produce can properly sustain, do they discover the smallest tendency to melioration even till this hour? But there can be no doubt, that if all the dung which has been dropped upon these wastes had been properly husbanded, a great and sensible melioration on them must have been effected many ages ago, as I shall have occasion to show in the sequel.

Again, taking the converse of the proposition above stated,—were it true, that the dung which is dropped upon pastures tended sensibly to meliorate them, it must follow that those pastures from which the dung is constantly abstracted by folding, as on Marlborough downs in Wiltshire, and many other places, must either have grown worse in the course of ages, even where it had not been touched by the plough; or at least must have advanced much more slowly in their melioration,

than other grass lands, equally untouched by the plough, from which no dung has been abstracted. Is this the case? I have not met with a single fact which tends to show that the present produce of the parts of those fields which have never been plowed, when compared with that of former times, differs in any respect from that of other fields of a similar nature, from which no dung has ever been carried away by folding.

Thus am I forced to conclude, that in all cases where animals are allowed to feed on pastures of any sort, the dung which is dropped from them is, in a great measure, lost as a manure; and a rigid economy would require that measures should be adopted for preventing this waste, if it can be done without occasioning evils greater than that which it is intended to correct.

Folding economical.—The remedy which first presents itself in this case, is that of folding; and if properly managed, there are perhaps few cases in which it might not be put in practice, not only without detriment to the stock, but even perhaps in some cases to their advantage. This was hinted at in the foregoing essay; but it is necessary I should be here a little more particular on this head.

All animals, but especially those that ruminate, choose to feed and rest by turns. Ruminating animals require much time for rest, and the more quiet they are allowed to be during that period, the better they will thrive. If these, then, are withdrawn from their pastures after they have properly filled their belly, and when they become necessarily disposed to ruminate, they can sustain no damage from being then put into a place where they can have no access to food. And if they be only as long detained there as till they have rechewed the food they had swallowed, and begin to feel an inclination to eat more, they will be even benefited by this confinement, rather than otherwise. For, in these circumstances, the creatures will thus be induced to feed and to rest all at the same time, so that when they are at rest, they are allowed to be wholly so, and can suffer no disturbance from one another, nor from any other cause; whereas if they be left at liberty to range over the whole field at large, at all times, they are not determined, as men are from habit, all to enjoy their meal at the same time, and thus to feed and rest as it were in concert; but each individual is left at random to feed or to ruminate as chance shall direct. Thus it happens that they seldom are seen all at rest at the

same time. While some individuals are disposed to ruminate, others are inclined to feed; and as they move about while feeding, the feeders disturb those who are at rest: for being all of them gregarious animals, while one who ruminates lies still, the others are moving forward; so that all such seeing themselves in danger of being left behind, are forced to rise and follow the rest, that they may regain those which are feeding. Thus it is, that though apparently left at freedom to rest when they please, they are actually put under a kind of constraint, and are forced to move about when they wish to lie still; whereas by an attentive mode of penning, all this disturbance will be entirely avoided, and they will be suffered to enjoy a repose as uninterrupted as their hearts could wish.

That penning, however, under injudicious management, may tend to retard the feeding of the animals subjected to it, cannot admit of a doubt. If the creatures be driven to a great distance from their pastures to the pen, it must subject them to a hurtful degree of fatigue; and this will be increased if they must be made to pass through narrow lanes, where they may be crowded and incommoded by passengers; or where they cannot avoid being at times mired in

dirt, or drenched in wet : or if they be neglected too long in the pen, or put up at improper times, &c. In some cases, owing to these circumstances, it may admit of doubt whether the stock itself does not suffer more damage from penning, than the benefit that results from the collecting of the dung : but from the abuse of a beneficial practice, we must not reason against the proper use of it.

To derive the full benefit from folding of which it is susceptible, it would seem, that where the pastures are of great extent, there ought to be two or more folds placed close by the pasture, at convenient distances from each other ; so that the flocks being gently conducted from one towards the other, feeding all the way, might find themselves, when full, just at the place into which they might retire for rest.— There they should be suffered to remain just so long as is found by experience to be necessary to compleat their ruminating process, and to prepare them for feeding afresh : they should then be suffered to rise and stretch themselves, when they naturally void their dung and urine on the spot. Thus will the dung be preserved, and the pastures be kept clean and sweet. They ought then to be led gently to the fresh pasture which

they had not lately breathed upon, or trampled with their feet, and which of course will be to them sweet and inviting: they should thus be slowly conducted to their next resting place, feeding all the way; and so on till they go over the whole in a regular progression. If experience shall discover that diseases are produced by suffering the animals to eat their food when covered with hoar frost, or dew, or mildew, or at certain times of the day or night, when snails or other creatures are abroad, which they may swallow with their food: in all these cases, when observed, the evil may, by an attentive economist, be avoided by means of a judicious use of the fold. He may, also, by the same contrivance, withdraw the creatures from the pastures at those times when they become restless and refuse to feed. In short, a judicious economist, by having folds properly situated, respecting the circumstances of shelter, coolness, water, and other conveniencies, may avail himself of these for greatly promoting the health and enjoyment of the animals, and thus accelerating their feeding; so that, independent of the benefits he shall derive from their dung, he will in other respects derive considerable emolument. But where is the man who thinks of these things in the pre-

fent day? They are despised, and therefore unknown.

In order to obtain some idea of the benefits that might be derived from penning, under a judicious system of management, when compared with suffering the produce to be consumed by animals which are allowed to pasture at large,—let us put the case, that two farms, each farm consisting of two fields of equal extent and alike in all respects; the one farm consisting of bare pasture, and the other of rich grass land; each field of the same farm being stocked with the same number of sheep,—were put, the one under the folding system of management, and the other under that of the unlimited pasturage system, and continued for a number of years,—and observe the result.

Say then, first, that the pasture was naturally so poor as, at the outset, in both cases, to be fit to sustain no more than at the rate of half a sheep *per* acre; and at that proportion was of extent sufficient to nourish one thousand head of sheep, consequently of 2000 acres extent.

We have already seen, that where the beasts are allowed to range at large, such a field will continue for ages without the smallest augmentation of its produce; and that, of course, if it

began with a thousand head of sheep, however long the experiment were continued, that farm, the produce of which was so consumed, would continue to the end to keep only the same thousand head of sheep.

In regard to the farm where folding is practised, let it be admitted that the extra flush of grafs produced on an acre, upon which one thousand sheep had been penned for one day, would be sufficient to sustain one sheep more the first year after folding, than it could have done without it; half a sheep the second year, and a quarter of a sheep the third year, beyond it's original proportion; and that, after the third year, the extra produce should be counted at the rate of $\frac{1}{8}$ of a sheep *per* acre for many years. Most persons will suppose this an under-statement: some may suppose it an over-ratio; but all will admit that the encrease must be something. I state it thus merely to show the general result, not the precise amount of that result; so that every individual may alter the ratio till it suits his own fancy. The general conclusion will not be altered by that circumstance.

On these data the thousand head of sheep ought to dung in one year 365 acres: but to make allowance for bad weather, and other con-

tingencies, let us deduct from that 165 days; and say that only 200 acres were dunged to a sufficient degree by that number of sheep in a year. By tracing the progress, the annual account will stand thus.

First year.

<i>No. of Acres.</i>	<i>No. of sheep kept.</i>	<i>No. of Acres dunged.</i>
2000 at half a sheep <i>per</i> acre	1000	200

Second year.

200 1 st year after dung 1½ do.		
<i>per</i> acre . —	300	
1800 do. original at ½ do. <i>per</i> do.	900	
—	—	
2000		
Total this year	1200	240

Third year.

200 2 ^d year at 1 sheep <i>per</i> acre	200	
240 1 st year at 1½ do <i>per</i> do.	360	
1560 original at ½ do. <i>per</i> do	780	
—	—	
2000		
Total this year	1340	258

It is unnecessary to carry this calculation any farther. The gradual melioration is, in this case,

established beyond a doubt, which, if continued for a great number of years, must produce a sensible improvement in every part of the country. I beg leave, however, once more to observe, that I do not contend to have attained any absolute accuracy in the *quantum* of the melioration above stated : all I contend for is, that by a management similar to the above, a progressive melioration would be unavoidable, the *ratio* of which might be in some cases greater, and in others less than here stated ; but that in every case it must be sensibly perceptible in the course of a great number of years. As no such melioration, however, is perceptible in fields subjected to pasturage alone, that practice must be deemed highly uneconomical.

Neither let it be understood as if I recommended the mode of penning, above stated, as the best mode that could be devised of applying the dung. It was selected merely for the sake of simplicity, for the purpose of illustration.—What is the most economical mode of applying dung for the purpose of agriculture at large, may come to be afterwards considered : at present it could tend only to embarrass the subject in hand, which is the economical consumption of the produce of grass land : these few hints being

only a digression, to show in what manner the farmer may prevent his lands from being fouled without inconvenience, and even with profit to himself.

Let us now consider the case of rich pasture fields: and, with a view to avoid the dilemma that might accrue from the supposition that very rich land derives little or no benefit from dung, we shall put the case, that the dung of the fold, in conjunction with lime, and such culture as the nature of the soil may require, can be applied to some poor ground of little value in the neighbourhood, to be put under corn.

Suppose in this case, again, that the rich grass field is capable of sustaining also one thousand head of sheep; and let us for the present take it for granted, till we can overtake it, that the produce will not be diminished by abstracting the dung of these sheep from it.

In this case, on the foregoing data, the dung of the sheep would be sufficient to manure 365 acres; which, as in the former case, we shall moderate to 200.

Let us suppose that the increased crop, in consequence of the dunging for the *first* year, is equal to two quarters of barley *per* acre. The

second year, white and yellow clover with ryegrass, equal to the feed of 3 sheep *per* acre.—
 The *third* year, equal to $2\frac{1}{2}$ sheep; and every year after that it should be equal to 2 sheep *per* acre.

The first year would be

<i>Sheep kept, heads.</i>				<i>Acres dunged.</i>
1000	—	—	—	200

Second year.

1000 head on the original field as before	—	200
200 acres of barley at 2 quarters, 400		
quarters at 24 shillings	—	L. 480
	—	—
Total	L. 480	200

Third year.

1000 sheep as above	—	—	200
600 more on the 200 acres dunged			
grafs land first year, at 3 head			
of sheep <i>per</i> acre, which would			
dung	—	—	120
200 acres of barley as before	L. 480		
—	—	—	—
1600	Total	L. 480	320

Fourth year.

<i>Sheep kept, heads.</i>		<i>Acres dunged.</i>
1000 head of sheep, as at the beginning	— — — —	200
500 do. on 200 acres of grafs the fecond year, at $2\frac{1}{2}$ head <i>per</i> acre	—	100
600 do. on 200 acres of grafs the first year at 3 <i>per</i> acre	— —	120
320 acres of barley, at 2 quarters <i>per</i> acre, 640 quarters as before	— — —	L. 768
2100	Total	L. 768 420

It is unnecessary to proceed farther in this enquiry; for the progressive improvement here is great and obvious, let what deductions you please be made for errors or exaggeration.—Every one may reduce this to the standard that pleases himself best; the same conclusion is unavoidable.

I consider it then as a truth undeniably established, that dung, dropped upon a field in pasture, either produces no effect whatever, or an effect far less considerable than it might be made to afford under a more judicious system of management; and that, if it has any effect at all

upon the pasture, it must be that of rendering the food yielded by these pastures less palatable, and less nourishing to the animals that feed upon it, than it otherwise might have been. To obviate this evil, which is every where felt by attentive farmers, especially upon rich pastures, different persons have adopted different devices, all of which are liable to strong objections in point of economy.

Hard or light stocking of pasture ground.—Some persons contend, that the pastures ought to be stocked very lightly; alledging, that although much of the produce is thus allowed to run to feed, which the beasts will not eat, and which of course is trodden underfoot, and rotted by rain, and thus wasted; yet, experience, they say, proves, that a greater profit will be thus derived from it, upon the whole, than by any other practice, on account of the superior thriving of the animals.

Others pretend, on the contrary, that light stocking of grass land is a practice highly to be condemned; as it tends not only gradually to diminish its produce, but also to encourage the growth of coarse and unprofitable grasses, which greatly deteriorate the pastures; and that hard

stocking of grass lands, especially those of a rich quality, is an indispensable requisite of good management.

These two opinions, so diametrically opposite to each other, and which are equally maintained by sensible men, clearly proves the embarrassment to which they are subjected, in consequence of their not having adverted to the circumstances stated above, and many other particulars that require still to be developed, as affecting the economical consumption of the produce of grass lands.

A third party, who approach perhaps nearer to the truth than either of the above, advise that a mixed stock should be always kept upon the same field: and were the consumption of the foul grass produced by the dung of the animals, the only article to be adverted to, it might be, doubtless, so managed as to correct this evil: but there are so many other circumstances to be adverted to, that it is not easy, by this mean, to get them all remedied.

In every field, a variety of plants spontaneously spring up, some of which are disrelished by one class of animals, while they are eaten by some others; and some of which plants, though eaten readily by some animals at a particular period

of their growth, are rejected by them entirely at another age. Thus it becomes necessary, not only to have a vast variety of animals in the same pasture; but also a very particular attention is required to augment or to diminish the proportion of some of these classes of animals, at particular seasons of the year, otherwise some part of the produce will be allowed to run to waste, unless it be hard stocked to such a degree as to retard their thriving.

But if a great variety of animals be allowed to go at large in the same pasture, they are never suffered to feed with that tranquillity which is necessary to insure thriving in the highest degree. One class of these wishes to feed, or to play, while the others would incline to rest. They thus mutually disturb and teaze each other: and this inconvenience is greatly augmented, if penning of any sort be attempted. From these considerations, the practice of intermixing various kinds of stock very much together, is found to be productive of evils, in many cases, greater than those which result from the waste of food this practice was intended to prevent. And though there can be no doubt that by hard stocking the grass will be kept shorter, and consequently will be more palatable in general to

the animals who eat it, than if it were allowed to run to a great length, and that thus even unpleasing patches may be consumed; yet as animals, which are to be fatted, must have not only sweet food, but an abundant bite at all times, to bring them forward in a kindly manner, it seems to be nearly impossible to obtain both these advantages together in the practice of pasturage.

Cutting, and consuming the produce in the house.—Might not these evils be greatly diminished, if not entirely remedied, in many cases, by having the produce cut by the scythe, and given to the animals fresh in the house; rather than to suffer them to go at large and eat the produce on the field, even under any system of management whatever?

Many arguments tend to show, that this practice would be, in general, highly economical. This subject may be considered under the following points of view:

First.—The greater or less variety of plants that would thus be consumed, and consequently prevented from running to waste.

Second.—Whether stall feeding or grazing tend most to promote the health and comfort of the animal.

Third.—The proportional quantity of manure obtained by the one or the other practice.

Fourth.—The quantity of herbage that will be afforded from the same field, under the cutting or grazing system.

Under head the *first*. If the consumption of the plants be the object principally attended to, it is plain the benefits will be great: for experience has clearly proved, that there are many plants which are greedily consumed by beasts, if cut and given to them in the house, which never would be touched by them when growing in the field. Of this nature is the dock, cow-parley, (*Chærophylum Sylvestre*) thistles, nettles, and many other plants. Upon what principle it should happen that these plants should be so readily eat, when thus given, while they are totally rejected when in the field, I cannot say: but that they are thus eaten, without reluctance, even when the animal is not hurtfully hungry, is evident from this circumstance, that the beasts often fall greedily to these at the moment they are brought in from the field, even before they have had time to become hungry after they had come in. Thus fewer plants will be rejected or suffered to go to waste.

In the *second* place. It is well known that many of even the best kinds of grasses, which, when young, form the most palatable food for these creatures, if once suffered to get into ear, are disrelished so much as never to be tasted by them, unless to prevent starvation; and as, in most pasture fields, many of these grasses get into ear from various causes, all the produce of these plants is inevitably lost to the farmer. But, if cut down by the scythe, in proper time, not one of these is ever suffered to get into that nauseating state; and consequently no waste is sustained from this cause.

Thirdly.—When animals are suffered to go upon the field, many of the plants are trodden under foot by the beasts, and bruised or, in part, buried in the earth; in which state they are greatly disrelished by animals, and are suffered to run to waste; which never could take place were the practice of cutting adopted. And,

Lastly, on this head. Those few plants which are totally disrelished by one class of animals, so as to be rejected by them even in the house, will not, from this circumstance, become less acceptable to others, but much the reverse. Food that an animal has breathed upon, for any considerable time, becomes unpleasant to other

animals of the same class; but not so to those of another species: it seems indeed thus to acquire for them a higher relish. Even greater defilement by one animal, seems to render food more acceptable to others: for straw, that in its clean state has been rejected by cattle, if employed as litter for horses, acquires a relish for cattle that they search for with avidity. Hence it happens, that the sweeping of the stalls from one animal, furnishes a dainty repast for those of another kind; which can easily be shifted from one to the other, if the plants are consumed in the house, but which must have been lost in the field. We shall soon have occasion to show that this peculiarity may be employed to answer another useful purpose.

Under head the *second*. If *the health and the comfort of the animal* be chiefly adverted to, the balance will be clearly in favour of the cutting system, when compared with that of pasturing. It is well known that when animals are exposed to the sun, in the open air, they are not only greatly incommoded on many occasions by the heat, but also are annoyed by swarms of flies, gnats, and hornets, as well as the terrible gad-fly, which drives them into a state of perturbation little short of fury, which must obviously

tend to retard their thriving. At other times they are hurt by chilling blasts, or drenched by cheerless rain, which renders their situation very unpleasing, and greatly retards their feeding, as is well known. Under proper management, in a well constructed stall, all these evils would be alike removed, and they would be kept perpetually in a proper state of coolness, tranquillity, and ease, so as to make the same quantity of food go farther in nourishing them than it otherwise could have done. They would also be prevented from licking up snails, worms, and other noxious creatures, among their food, which by pasturing they are apt to do, when they feed at those times of the day, or night, when these creatures crawl abroad. This would be entirely avoided by cutting the grass at those times of the day when none of these are to be found. Thus lingering diseases might often be avoided, which always retard the thriving, and often prove totally the destruction of the animal. And, *lastly*, by giving an opportunity of administering dry and nourishing food, along with the soft and succulent, where circumstances require it, in any requisite proportions, and by varying the tastes, so as to provoke an appetite, not only the health, but the thriving of the creatures, would

be greatly augmented beyond what they otherwise could have been.

Under the *third* head. If *manure* is to be chiefly attended to, there can be no comparison between the two modes of consumption. This is so greatly in favour of stall feeding, that it would be idle to spend time in searching for proofs of a proposition that may be considered as self-evident.

In the *last* place. If the *quantity* of herbage produced from the same field be adverted to, it will be found to be equally in favour of the cutting system. It is well known, that all animals delight more to feed on the young fresh shoots of grass, than those that are older. Hence it invariably happens, that those patches in a pasture field that happen to have been eaten once bare, in the beginning of the season, are kept very short ever afterwards throughout the whole of that season, by the creatures delighting to feed upon them in preference to the parts of the field that have got up to a greater head; so that these last are suffered to remain, in a great measure, untouched, throughout the season. It is not however, in general known that grass, even the leafy parts of it when it has attained a certain length, becomes stationary; and, though it will retain its verdure

for some months in that state, makes no sort of progress whatever; whereas if it had been cropped down frequently, it would have continued in a constant state of progress, advancing with a rapidity in a great measure proportioned to the frequency of it's being cropped. For experimental proofs of this fact, see essays on agriculture and rural affairs, vol. II. disquisition V. Nor has the diminution of produce that must thus be incurred, ever been adverted to by persons who are interested in it; nor have these circumstances entered in any respect into their estimation. From my own experiments and observations, however, I am satisfied that, in some cases, the actual produce of the same field, by a judicious management *in this respect*, compared with bad management, may be augmented *fourfold* in the same season. It is owing to this circumstance, though the reason of the fact has not been understood, that hard stocking of pasture lands has been found to enable the same field to sustain a much greater weight of stock than it could do when lightly stocked. But under no system of management can the evil of unequal cropping of land under pasturage be avoided, unless it be by a destructive degree of hard stocking, which must be avoided where the animals are expected to thrive. By

cutting with the scythe frequently, so as to keep the grafs always short, and therefore in a state of continual vigorous vegetation, all these evils are avoided. The quantity of produce will be raised to the *maximum* that the land, in it's present state, is capable of producing, while the stock to be fed by that produce needs not be in the smallest degree stinted in point of food.

Under every point of view, then, that this question can be considered, we are forced to conclude that the practice of cutting of grafs, and consuming it green, in all cases where the ground is in a state that can admit of it, when compared with that of pasturage, appears to be so greatly economical, that the particulars under which that mode of management can be practised, and the peculiarities affecting it, deserve to be much more minutely investigated than they ever yet have been.

In confirmation of the justness of this conclusion, it is now universally admitted as a fact, confirmed by innumerable experiments, that a crop of red clover, when cut, and consumed in the house green, goes in all cases much farther in feeding beasts, than when it is consumed by pasturage upon the field. The lowest estimate that I have ever seen made on this head, from actual

experiment, is, that it will go at least twice as far when cut, as when pastured upon: some go as high as to say it will go *four times* as far. As every person, who has tried the experiment, agrees that the saving, by cutting this crop, is very great, that practice has of late years begun to prevail very much; though reason has not yet been able so effectually to stem the torrent of ancient prejudice, as to render it entirely universal.

But the practice of cutting other grass grounds, and consuming their produce green, seems not yet to have been deemed even practicable, and has not of course been ever thought of being experimentally tried, although I have reason to be satisfied, from some experiments that I myself have made, and the considerations above stated, that the benefits to be derived from consuming the produce of rich grass lands *of any sort*, in this way, will be even greater than that which takes place with regard to red clover.

The circumstance that made me first advert to those benefits that might be derived from consuming grass lands by cutting, in preference to pasturage, was merely accidental. I had a pretty long and broad grass walk, leading from my dwelling house to a garden, which could be avoided, when inconvenient to walk upon it, by taking

another path: and as the pile upon this avenue was extremely close, I found it very pleasing to walk upon it, while free from wet, even when the grass was an inch or more in length. Instead, therefore, of having it close shaven like a lawn, every three or four days, and throwing the sweepings away, as usual, it occurred to me that by cutting it less frequently, I should be able to have all the use of my walk I wished for; while I would at the same time, lose no part of the produce. From these considerations, I resolved to have it cut so as to admit of being given with economy to my cows, while in the house. As much grass was, therefore, cut each day from it as served my beasts for the time; and so proceeding on regularly, first cutting one side of the walk from end to end, and then the other, the walk being frequently rolled when fresh cut, especially after rain, to keep the surface smooth, so as to allow the scythe to cut quite close. In this manner I not only effected the purpose originally intended, but, to my great surprise, I had soon occasion to perceive that I thus obtained food for beasts much greater in quantity, as well as sweeter in quality, than I had ever been able, under any other mode of management, to obtain from the same extent of ground. The grass was cut

six or seven times during the season; and at each time the quantity, on account of the extreme closeness of the pile, was much greater than I could have supposed, and of a much sweeter quality also. There was not in the whole, a single blade of grass that was either bruised or decayed in any way, so that the beasts devoured it with inconceivable avidity; whereas if, upon such rich land, it had been allowed to stand a little longer, the root-ends of the grass would have begun to wither and turn musty for want of air though the top continued green, some stalks also being choaked by others, would not only begin to rot, so as to become unpalatable to the animals, but their roots also, being suffocated, begin to die out, and the grass becomes thinner, so as to be longer of springing up after each cutting; and thus the *quantity* of the produce is diminished, as well as its *quality* much impaired. Some farmers, to whom I showed this experiment in the course of its progress, judged, when they looked at the grass while growing, that it would be too short to be worth while to cut it; but when I caused some of it to be cut before their eyes, the *quantity* laid down by each swathe was so much greater than they expected, as to excite a high degree of astonishment. Some of them even ad-

mitted, that the quantity of forage thus obtained at one cutting, though it did not, at the most, exceed two inches in length, was in their opinion equal to that obtained at one cutting of a field of red clover, when advanced to be in full flower; and my own opinion coincided with theirs. This experiment first suggested doubts in my mind, as to the propriety of consuming *rich* grass lands by pasturage; and every observation I have since made, has tended so strongly to add to my conviction, that I have now not a doubt remaining upon this head; and I conceive that the loss which is annually sustained by the nation at large, from an inattention to this circumstance, is so great as, in some measure, to call upon me to publish these remarks, with a view to direct the attention of others to investigate the subject with greater care than it has hitherto obtained: for, however inattentive men may be for the present, to these hints, a time will come, if they are made public, when they will claim the investigation of some considerate mind. When that time comes, my object will be attained.

Since the former edition of this work was printed, I have met with a publication by Dr. Thaeer, physician of the Electoral court of Hanover, and published in the first volume of *Commu-*

nications to the Board of Agriculture, &c. p. 376, in which I am happy to find, that the conclusions I have drawn above, by reasoning from the few facts that have fallen under my own observations, have been confirmed by experience of Baron de Bülow and others; which have proved, as Dr. Thaer says, that the following facts are incontrovertible.

“ 1st, A spot of ground, which, when pastured upon, will yield sufficient food for only one head, will abundantly maintain four head of cattle in the stable, if the vegetables be mowed at a proper time, and given to the cattle in a proper order.

“ 2^d, The stall feeding yields, at least, double the quantity of manure from the same number of cattle [hence *eight* times the quantity of manure from the produce of the same field]; for the best and most efficacious summer manure is produced in the stable, and carried to the fields at the most proper period of its fermentation; whereas, when spread on the meadow, and exhausted by the air and sun, its power is entirely wasted.

“ 3^d, The cattle used to stall feeding will yield a much greater quantity of milk, and encrease faster in weight, when fattening, than when they go to the field.

“ 4th, They are less subject to accidents, do not suffer by the heat, by flies and insects, are not affected by the baneful fogs that are frequent in Germany, and bring on inflammations; on the contrary, if every thing be properly managed, they remain in a constant state of health and vigour.”

Dr. Thaer believes that the stall system of feeding on green herbage has never been adverted to by the farmers or agricultural writers of Great Britain. It appears that he, in this respect, labours under a mistake; yet it cannot fail to prove very satisfactory to me, to find a practice I have so warmly recommended to the attention of my countrymen, so strongly supported by the experience of practical men in Germany. It deserves, however, to be noticed, that the observations of Dr. Thaer seem to respect broad clover alone, and not any culniferous grasses, although I am satisfied from my own experience and observations, that the economy in the consumption of these last kind of grasses, green in the house, will be much greater than that which will result from the consumption of broad clover in this way. Hence I cannot help warmly recommending the following experiment to the notice of the British farmer, in hopes that some person of enterprize and accuracy will see

it carefully performed. I regret that my present situation does not admit of it's being done by myself.

Experiment prop, sed.—To assist such well intentioned investigators, it may perhaps be proper for me here to state what I should conceive to be the most economical mode of consuming the produce of rich grass lands, that it may be subjected to the fair test of accurate experiments, conducted more at large than the circumstances of my farm permitted me to make.

If two fields of *rich* grass land can be found of exactly the same extent and quality, the experiment can be fairly made, by stocking the one with cattle, allowing them to pasture upon it, and reserving the other to be cut and given to cattle of the same kind, by hand, properly kept in the house ; the difference of the profit drawn from each class of beasts, will thus ascertain the comparative value of the two modes of management

I need scarcely observe, that in order to make the experiment fairly, the two fields should be as much alike in all respects as possible ; and, in particular, that the surface of the land intended to be cut should be smooth and even, so as to ad-

mit of being rolled frequently: for which purpose, the flatter the ground is in general the better.

Let the field that is to be cut be carefully shut up from cattle, especially during wet weather; and let it be rolled with a weighty roller in the spring, as soon as it is firm enough to bear the tread of the beasts without hurting the surface, first in one direction, and then in the direction across it. If it be twice rolled in that manner, it will be an advantage rather than a detriment, for it is of the utmost consequence, under the mode of management proposed, that the scythe should cut very close, without taking up any earth; one quarter of an inch at the bottom is as much as a whole inch at the top; so that, on account of the quantity of grass to be obtained, close cutting is of the greatest use. It tends, also, greatly to promote the quick springing up of the succeeding crop, as I have often observed; and by this practice, no dead leaves are left, which is unavoidable in rough cutting. Frequent rolling, with a weighty roller, while the ground is a little soft, is absolutely necessary for this purpose; and is also of use on other accounts, as will afterwards be noticed.

The field should begin to be cut when the longest piles of grafs on it have attained the height of two inches at most, and proceed regularly, day by day, cutting as fast as the beasts consume it, so as to go over the whole in three or four weeks, as the weather is warm or cold; when that which is was first cut will be ready to be cut a second time, and so on; never omitting to roll it when the weather is moist, and not too wet. The grafs should be carried off in a light sparred or wicker cart, drawn by one small horse; this cart to move upon three broad low wheels, placed two on one axle, and one on another, below the body of the cart, so as to act as a roller when going over the ground: a cart, or rather barrow, of this construction, I had made, and found it a most convenient implement. In this manner the work will proceed regularly, and without trouble throughout the whole season: the beasts should be regularly fed; getting only a small quantity at a time, but frequently, fresh and fresh; giving them sweet water when necessary, and as much grafs as they will eat, allowing them proper time for rest. Nothing should be left in their stalls, at these times, to be breathed upon, and thus rendered disgusting to them; and if the house be so constructed as that the beasts can be easily kept cool to a pro-

per degree, quiet and clean, they will thrive abundantly.

From the result of this experiment, when fairly made, and often enough repeated, so as to guard against the effects of accidental unobserved peculiarities, many corollaries may be drawn, that will be found of high importance, in regard to rural economics.

In making this experiment, however, the full result of it cannot be clearly perceived, unless it shall be continued for several years; for, in the course of time, many important changes may be expected to follow, both in regard to the quantum of the produce of the two fields kept under these two modes of management, as in regard to its qualities. The experiment of one year can do little more than ascertain what is the result while the produce is nearly of the same quantity and kind; but as changes in both these respects may be expected, the comparison between the real benefits to be derived from the one or the other mode of management might be very fallacious, were it not continued for several years; and to do justice to the experiment, the whole dung made by the beasts in the house, should be returned to the field which produced their food.

Grass lands, if constantly cut, are not deteriorated.—What the changes would be, both in regard to the quantity and the nature of the produce from the same field, if annually cut, and the produce carried off, as above mentioned, or if consumed by suffering beasts to pasture upon it, cannot at present be told with certainty; but there are not wanting facts that may enable us to have some idea of the probable result.

It has been rendered probable, at least, from facts already stated in this essay, that dung, when dropped upon land by cattle pasturing upon it, does not tend to enrich it perhaps at all; or if it does so, it is only to a very small degree.

Whether *rich* grass land, if constantly cut, and the produce carried off from it, without returning any of the dung, will thus, in time, come to produce crops less abundant than the same land would have done, if kept under pasturage, will not, with many persons, seem to admit a doubt: yet there are considerations which so strongly operate upon my mind for doubting if this be the case, that nothing short of actual experiment can remove those doubts. I have often seen lawns around gentlemen's houses that have been kept under a course of continued shaving for time immemorial, that discovered no symptoms of exhaus-

tion, nor any sensible diminution of luxuriance or of verdure, though no manures of any sort had ever been laid upon them. This fact struck me as an important one; and that I might not be mistaken with regard to it, I applied for information respecting this particular, to a gardener who had had charge of very extensive lawns of this sort, belonging to a gentleman of large property: he assured me, that for the space of upwards of thirty years, that he had had the care of these lawns, some parts of them which had been laid down long before he knew them, and were originally, as he supposed, of a rich quality, had never received, during all that time, the smallest quantity of manure of any sort; and that the lawn continued to be equally close in the pile, equally verdant at all seasons in the year, and required to be as often cut as ever; and that, in short, he had no reason to apprehend that the quantity of its produce had diminished in the smallest degree. This seems to me a strong presumptive proof that grass land, when once of a rich quality, may be continued for an indefinite length of time under the scythe, without being at all deteriorated, even where it gets no return of dung that is annually made for the produce of it. And as we have already seen that rich grass land,

under pasturage, produces as much dung as ought to manure each year more than double it's own extent of surface ; it follows, that if the same quantity of grass land will only nourish as many beasts in the house, as if it were pastured upon, (and there are strong reasons for thinking it will do much more,) there can be annually obtained from each acre of land kept under the scythe, as much dung as might manure two acres more, which might be abstracted from that grass land without deteriorating it. Of course, if the land be such as that it can admit of being made richer, a dressing of that dung, now and then returned upon itself, would give it the richness wanted, without any extraneous aid. In this point of view, then, it seems to be impossible to deny, that rich land, if kept under the scythe, can never become poorer, if none of the dung made by the beasts fed upon it be abstracted from it ; but that, on the contrary, it can thus be made to afford a large annual supply of dung for the purpose of enriching poorer land, while it still continues to be equally fertile itself.

In regard to the other effects of the practice recommended, there seems to be no doubt that the *quality* of the grass must continue to improve while under the scythe, much more than while under

pasturage. Every person who has bestowed the smallest attention to objects of this sort, must have remarked that the worst kinds of grasses grow most freely upon those parts of rich grass lands that are the most open and spongy in their texture; and that they are in general much sweetened in the pile, where they chance to be much trod upon. Hence the finest grasses, on such fields, are always found to abound most upon those paths which are moderately trod upon; white clover and the sweetest grasses being seen there in abundance, while they are less frequent in the spongy parts of the field. But frequent rolling tends to produce this effect more universally and equally, than any kind of treading by beasts (a practice frequently recommended by the best farmers,) ever can do.

Again.—It has been frequently remarked, by intelligent farmers, that the hard stocking of land tends much to improve the quality of the pastures, as well as it's quantity. On this subject as well as many others, the observations of Mr. Davies, of Longleat, in his account of the agriculture of Wiltshire, deserve to be particularly adverted to. He observes, p. 18. that “the sweetness of the
“ seed depends much more on it's being kept
“ close, and eaten as fast as it shoots, than on any

“ peculiar good quality of the grafs itself: for
“ there are many downs that, when clofe fed,
“ appear to be a very fweet pafture, but which,
“ if fuffered to run a year or two without a full
“ flock on them, will become fo coarfe, that
“ fheep *will almoft as foon ftarve as eat the grafs*:
“ and even in thofe parts of the downs where
“ the finer and fweeter graffes abound, the foil
“ is frequently fo loofe and porous, that nothing
“ but constant treading will prevent them from
“ dying out, or being choaked by the larger and
“ coarfer graffes.” And again, p. 23: “ They
“ alfo fay, that this new kind of fheep being fo
“ much nicer in their food, and rejecting the
“ feed of the downs, on which the chief depend-
“ ance for fheep food is, have fuffered the her-
“ bage to grow gradually coarfer and coarfer;
“ and that the farmers, in attempting to remedy
“ this evil, by fhortening their flock of fheep,
“ have made it worfe; it being a well known fact,
“ that *the clofer the downs are fed, the more*
“ *flock they will keep.*” He farther remarks,
that in confequence of too light flocking, heath,
in fome cafes; comes in the place of the better
graffes. But it is very evident that all the pur-
pofes of hard flocking, that is, keeping the grafs
fhort, and in a continual ftate of vegetation, and

consequently sweet, and preventing the coarser grasses from running up to stalk and overpowering the others, together with the consolidating of the ground by treading, would be obtained with much greater certainty by the practice of mowing; while the animals that consumed the produce could in no case be subjected to a stint of food, which they necessarily must sometimes be, where reliance is had upon hard stocking alone for preventing this evil.

From these considerations, there seems to be good reason to believe, that not only would an equal quantity of produce go farther, if cut and given green to beasts in the house, than if it were pastured upon, but that, by a continuation of this practice for years, the ground kept under the scythe would gradually improve, so as to produce a greater quantity of food; and that also of a richer quality, than if it had been kept under a course of pasturage; while, at the same time, a great quantity of dung might thus be acquired for the purpose of fertilizing other soils of a poorer quality. The reader, however, will please never to forget, that though this reasoning be very *probable*, it amounts not as yet to a *certainty*; nor can it ever do so, until some decisive experiments shall be made to ascertain with pre-

cision the facts that are as yet but imperfectly known.

Sweetness of pastures, what.—The term, *sweetness of pastures*, used above, and sweet kinds of grafs, frequently occur in agricultural writings: yet, it is doubtful if ever they have been properly defined, so as to convey a precise and accurate meaning to the reader, or been so much adverted to as their importance deserves. I shall here attempt to supply these defects.

Those pastures which animals choose to feed upon, in preference to others, and which in general are eaten down close to the ground, are said to be *sweet* pastures, in contradistinction from those where the grafs, being disrelished, is suffered to grow to a greater length, and often to wither in part, without being touched, which are called *coarse*, or, if tending to dampness, *sour* pastures.

Without entering here into a disquisition concerning the circumstances that tend to produce this sweetness of pasturage, which are various, I shall only observe, that from whatever cause it originates, it is, in as far as I know, an universal rule, that in every case the younger the grafs is, the sweeter and more palatable it will

be to beasts of every sort ; and that the same weight of food will go much farther in nourishing or fattening an animal, if it be very pleasing to the palate of the animal to which it is given, than if it had been less toothsome. As this is a fact that has not been so much adverted to as it deserves, it requires to be here particularly investigated.

It is here necessary to advert, that a certain quantity of food is required for the mere sustenance of every animal, and if that quantity be daily administered to it, and no more, the creature will barely subsist, and neither grow better nor worse, if fattening alone is considered ; and of course will never return, in the way of fattening, any profit to the farmer for that portion of it's food, however long it may be continued upon it. But if the beast shall get a greater quantity of food than this portion which is barely necessary for subsistence, that surplus food then goes to augment the size, and to *fatten* the animal, and of course yields a profit to the farmer, in proportion to it's quantity.

If this fact be admitted, it will necessarily follow, that the greater the proportion of this surplus food the creature can be induced to eat, in a given time, the more quickly it will be fat-

tened, and, of course, the greater will be the profit of the farmer. For example,—if it be supposed that ten pounds of forage be the exact quantity of food required each day for the *sustenance* of the animal, there would be consumed by it, in the course of one year, 3650 pounds of food, without any profit at all as a fattening beast.

If, again, it be supposed, that by the addition of one pound of food each day, the animal got so forward, as in the course of one year to be fattened and advanced in it's value to the amount of 50 per cent. of it's original price, the account would stand thus:

Case first.

	lbs.
For sustenance for 365 days - - -	3650
For fattening 365 days at 1 lb. - - -	365
In all	4015

Case second.

But if the beast were allowed two pounds extra each day, it would consume 365 pounds, (which, in this case, we are to suppose will *fatten* the beast as much as in the former

case,) in six months, or $182\frac{1}{2}$ days, say 182.

The account would, in this case, stand thus :

For sustenance 182 days at 10 lb.	- -	1820
For fattening	- - - - -	365
In all		2185

Case third.

If the beast be allowed *four* pounds extra each day, it would consume 365 lb. in three months, or 92 days. The account would in this case be

For sustenance 92 days at 10 lb.	- - -	920
For fattening	- - - - -	365
In all		1285

Case fourth.

If the beast could be induced to eat eight pounds extra *per* day, it would consume 365 lb. in six weeks, or 46 days, in which case the account would stand thus :

For sustenance 46 days at 10 lb.	- - -	460
For fattening	- - - - -	365
In all		825

From hence it appears, that if the beast
were fattened in the following periods,
it would consume

If fed for one year - - - - - 4015

If half a year - - - - - 2185

So that the saving in this case will be 1830

If fed for three months, it would con-
sume only - - - - - 1285

Which deducted from - - - - - 4015

Gives a saving of 2730

If fed for six weeks, it would consume - 825

Which deducted from - - - - - 4015

Gives a saving of 3190

So that the same quantity of food, which would
sustain no more than *one* beast, if it were so
sparingly administered as to require a whole year
to fatten it, would be more than sufficient to
fatten *four*, if they could be induced to take it
in such quantity as to fatten in six weeks
only.

But as it is hunger alone that can induce any
animal to eat such kinds of food as are unpala-
table to that creature, it is impossible to get the

animal to eat more of coarse unpalatable kinds of grass than what is necessary for bare subsistence only; so that such fields must be appropriated to breeding only, because, in the way of feeding, they can return no profit whatever to the farmer, by a kind of stock which disrelishes that food. If it be a little sweeter, they may get on a little; but the profit, in this case, will be very small. Render the grass more sweet and palatable, they will fatten the more quickly, and the farmer's profit be thus augmented: and so on almost in a geometrical *ratio*, in proportion to its augmented sweetness. Under this point of view, whatever tends to render the produce of fields more sweet and palatable to the animals which feed upon it, is a very great national improvement; because it answers the same purpose that a large augmentation in the quantity of the produce would do. But if the *quality* can be improved at the same time that the *quantity* can be augmented, it will be a two-fold gain, and the greatest national benefit will thus be obtained. But as it has been already shown that every kind of grass will be rendered as palatable as it is possible to be, by being cut and given to them in the house, while the quantity of its produce will, at the same time, be there,

by augmented, it seems to be impossible to doubt that the practice must be highly economical.

Allow me here to point out one other obvious inference from the reasoning above, that has been hitherto but too little adverted to. It is well known that very rich land in general produces the sweetest pile of grafs, and that calcareous manures, in particular, have been remarked as being peculiarly calculated for producing this effect: it hence follows, that it is the best economy to lay lands down to grafs while they are in the most fertile state, before they have been exhausted by frequent corn crops, especially after liming. Land may certainly be made too rich for corn crops; but I do not know if that can be the case with grafs land, under a proper management.

I cannot too often warn the reader to take notice that the foregoing, and every other *illustrative* calculation that occurs in these essays, is not to be considered as accurate in regard to the *quantum*, but merely in respect to the tendency: for I am by no means in possession as yet of facts upon which *accurate* calculations, in regard to the precise degree of profit or loss, in cases of this kind, could be determined. I know of

no fact that has been yet brought forward, which clearly ascertains whether the degree of melioration is exactly in proportion to the *surplus* food of any sort that an animal can be brought to eat in a given time, though the probabilities are greatly on that side.

Neither do I know if it be an universal rule, when animals *of different kinds* are compared with each other, that those kinds which can be made to eat, in a given time, the greatest quantity of food, can be the soonest fattened. The subject has never as yet, that I know of, been adverted to.

Under this head it deserves to be remarked, that when horses and cattle are fed upon the same kind of grass, it is universally admitted that the horse, if of the same weight, consumes more grass in a given time than the ox; and it is also a certain fact that the horse will become fat in much less time than the ox. It is generally, I think, allowed that a horse, living upon rich pasture, may be made as fat in one month, as a bullock upon the same pasture could be made in three. What is the exact proportion of food that would be consumed by these creatures, in the same space of time, has not, as yet, that I know of, been accurately as-

certained; but the general estimate that has been made, from the experience of former times, is, that two horses consume as much food as three cows or bullocks in the same time: and they are so paid for in pasture fields, where they are both taken in upon time. If both these facts are so, it would appear that a horse could be fatted on less food than an ox. For,

Three oxen at 12 lb. would consume 36 lb. each day; which, in 93 days, amounts to 3348 lb. that is, for each ox, 1116 lb.; and two horses, consuming also 36 lb. a-day, will eat in 31 days 1116 lb. which is at the rate of 558 lb. consumed on the fattening of each horse. So that, on these data, the horse can be fatted with precisely one half the quantity of food that the ox can. If this be so, the saving to the nation would be great indeed, were we at liberty to fatten horses for food to man, instead of cattle: but prejudice says that this must not be done.

I have often thought that the refusing to eat the flesh of horses in Europe, is an unreasonable, prejudice that ought to be overcome. It is indeed forbidden by the law of Moses, to which origin we can trace many of our vulgar prejudices what have been gradually overcome: the animal itself is a beautiful clean feed-

ing creature, so that no aversion can be excited on that account: it's flesh, wherever it is eaten, in common with that of bullocks, is invariably accounted the greater delicacy of the two; and there are not wanting persons in this country who have tasted it, and concur in the same opinion. The prejudice, then, must be accounted highly unreasonable; and why should it not be overcome? Many persons among ourselves have got over the much better founded prejudice they had once entertained against eating swine's flesh, and now relish it perfectly well. The common people, at this moment, shudder at the idea of eating a frog; yet many persons in the polite circle have overcome that prejudice, and admit it to their tables as one of the greatest delicacies: and what is to hinder them from overcoming in like manner their prejudice against horse flesh? We have seen above, that it might prove a mean of reducing the price of meat, and augmenting the produce of the country: I shall only add, that humanity would strongly plead in behalf of this exertion: for were the flesh of horses to be eaten, instead of being worked to death, as they now are, and subjected to a treatment that outrages the feelings of nature, they would be put up to be fed; kindly

treated and pampered with delicacies, so as to have the full enjoyment of life till the last moment they are suffered to exist.

That some particular kinds of food have a greater tendency to produce fat than others, there seems to be little doubt ; and that others prove more nutritive for a given quantity, is undeniable. But the comparative value, in these respects, is in every case as yet unascertained ; so that here a wide field of investigation remains that is wholly unexplored, which must be done before we can pretend to have attained any thing like a proper system of economy ; but even a beginning, however feeble, is some faint advance in an unexplored region.

Condiments, their importance on domestic economy.—On adverting to what has been said above, it will appear that too little attention has hitherto been bestowed to the subject of condiments as affecting animals. Hitherto the greatest part of mankind seem to forget that mere animals have the sense of tasting in as great perfection as man ; and are disposed to indulge their appetite for sensual gratifications, without any restraint, wherever circumstances put it in their power. The uses that may be made by man,

for his own emolument, of this natural propensity of animals, are very obvious when adverted to. Yet I know no case in which the general attention of men seems to have been strongly turned to that point, unless it be in respect to the fattening of calves : for I have met with few persons who have had an extensive practice in this department, who are not sensible that the profit is in proportion to the quantity of milk that the creatures can be induced voluntarily to take in a given time. This solitary fact is known by thousands, who never once think of extending it to any other case of animal existence. But there are not wanting a few persons, who, in consequence of accurate observation, have discovered the vast importance of studying with care the taste of the creatures they feed, that they may not only furnish them with the kinds of food they like best, but also to vary these from time to time, and to give them exactly in the quantities, and in the way that they find will induce the creatures to eat the most ; having the full experience that the profit to be drawn from feeding beasts is always proportioned to the increased quantity of food they can get each individual *coaxed* to consume in a given time. In this branch of rural economics, I have met with no

person who has made greater progress than a plain practical farmer at Hope, in the neighbourhood of Manchester, who spares no trouble nor expence in procuring such kinds of food and condiments as he finds best calculated to induce his cows to consume, in a given time, the greatest quantity of food possible. The consequence is, that this man makes much money, where his neighbours, who are not in the secret, and more niggard in their outlay than he is, sustain a loss. Among other condiments, this man has discovered that *pure* water stands pretty high in the scale; on which account his beasts are never suffered, far less obliged, to taste a drop of water that has ever been sullied by any animal setting a foot into it. With this view, they are always served with running water, which is, for their convenience, received into a long wooden trough, through which it passes while they are drinking. Such poor beasts, as are compelled, through necessity, to drink out of those muddy stagnant pools, in which other cattle have waded for days together to cool themselves in hot weather, which are fully impregnated with their dung and piss, feel the inconvenience of this nauseating draught; and the farmer of course suffers an abatement of his profit to an astonishing degree. Astonishing

to him, it may be justly called: for though he feels the effect, he seems to be ignorant of the cause, and therefore suffers it to exist, without an attempt to remove it; as every attentive person must have observed in many thousand cases.

There can be little reason to doubt, that animals which can be induced voluntarily to take an extra quantity of food in a given time, will be quickly fattened by that practice; but we would scarcely be inclined to suspect, that the same effect would be the result where the animals are compelled involuntarily to take a much greater quantity of food than they ever would do, if left entirely to themselves, were we not in possession of facts which undeniably prove that this is certainly the case. The practice of *cramming* fowls, as it is generally called, establishes this point beyond a doubt.

The following method of fattening geese, in Languedoc in France, while it proves the position here stated, deserves to be generally known, as it will give some hints that may be useful in fattening other animals.

After the bird has got into *full flesh*, (*i. e.* by being well kept upon green food,) it is necessary not to delay the fattening of them too long.

lest you lose the season entirely. About the end of December they enter into rut, *after which time they will not fatten at all*. As soon as the frost has set in, (usually towards the end of November,) they are shut up, to the number of *ten or twelve*, (never more) in a dark still place, where they can never see light, nor hear the cries of those which are kept for laying. They remain in that prison till they have attained the greatest degree of fatness, and are ready for killing: that moment must be seized, otherwise they would very soon turn lean, and at last die.

There are two ways of fattening of them.—The *first* is, by giving them a trough filled with grain, which they call *farde*, so that they may eat whenever they please. [I do not know what kind of grain is denoted by the word *farde*. Perhaps it may be buck-wheat. It does not seem from what follows, that the effect of the operation called malting on grain, intended to feed animals, is there known.] The geese fattened on this grain are very delicate. Others put into the trough grains of maize boiled in water.—They take care to give them *plenty* of that food, and *to keep the coop clean*. At the end of two or three weeks the geese are all fully

fattened. They are then taken out of the coop, and allowed to go at large into the water for twenty four hours. Without that precaution their flesh would have a disagreeable flavour.—

The above may be called the natural method of fattening, by *enticing* them to eat food enough of their own accord. The *second* may be called the *artificial* method, and is as follows :

The geese are put up in the same manner as before, and are *crammed* twice a day, by putting into their craw, by means of a tinned tube, as much as it will hold, of maize boiled in water. The tube is used, because the bill of the goose being furnished with teeth, the person who should attempt to perform that operation by hand, would soon have it scratched and torn to pieces. By this means, the geese acquire a *prodigious fatness, so that a pair sometimes weigh from fifty to sixty pounds*. Their liver weighs from one pound to a pound and a half,—is white and delicate ;—but has a slight bitterness to the taste, which the liver of a duck has not. The *hearts* are large, like a small apple, and when dressed on the gridiron, they are excellent eating. The feet are boiled, after which they are fried the same as the tongue.

Ducks are fattened in the same place as under.

When the ducks are pretty fat by the usual modes of feeding, they are shut up eight by eight in a dark place. Every morning and evening, a servant puts their wings across, and placing them between his knees, opens their bill with his left hand, and with his right fills the craw with boiled maize: they sometimes die suffocated; but they are not a bit the worse for it, provided care is taken to bleed them directly.—The unfortunate animals pass there fifteen days in a state of oppression and suffocation, in consequence of *their liver* growing large, which keeps them always panting, and almost without breathing. *When the tail of the duck spreads out like a fan*, they know that it is fat enough; they are then turned out to bathe in water, after which they are killed.

“ I have opened two ducks, of which the one had not, and the other had been crammed. The first had a liver of the natural size, the skin equally thick in all places, and the lungs perfectly sound. That which had been crammed, had *an enormous liver*, which, covering all the lower part of the belly, extended as far as the anus. (The ducks are generally suffocated when, by the pressure of the liver, the anus is opened, and the liver appears at its orifice.) The lungs were

small, and loaded with blood. The skin of the belly, which covered the liver, was of the thickness of a shilling. When the ducks thus crammed, as well as the geese, have been plucked, they seem balls of fat, and none of their members are discernable."

There are some inferences, not a little curious, may be drawn from these facts, in regard to the fattening of other animals. Not only does it confirm the general position assumed above, that the more food an animal can be made to take, in a given time, the quicker it will be fattened: but this rule seems to hold, when it is given even in a *hurtful* quantity, beyond what the animal would naturally have taken; and farther, that by certain modes of feeding, when well understood, the size of particular parts of the body can be augmented at pleasure, far beyond their natural proportions. Could the quantity of tallow in quadrupeds be augmented nearly in the same proportion to the liver, in this case, it is evident the profit to the owner would be greatly augmented. The following mode of fattening poultry, as practised by an experienced person in Britain, approaches nearer to that *natural* mode of feeding, and concurs in confirming the general doctrines.

Receipt for feeding poultry.

“ Very short time is necessary. If a chicken be not fat in a *week*, it is distempered.

“ Poultry should be fattened in coops kept *very clean*. They should be furnished with gravel, *but with no water*. Their only food, barley meal, mixed so thin with water as to serve them for drink. Their thirst makes them eat more than they would, in order to extract the water that is among their food. This should not be put in troughs, but laid upon a board, *which should be clean washed every time fresh food is put upon it*. It is foul and heated water which is the sole cause of the pip. The preventative is obvious.”

Common salt, value of, in feeding beasts.—
There is no substance yet known which is so much relished by the whole order of *gramenivorous* animals, as common salt. The wild creatures of the desert are so fond of it, that wherever they discover a bank of earth impregnated with a small proportion of salt, they come to it ever after regularly to lick the saline earth, as they would to a pool of water for drink, were

there none other near; so that when a hunter in America discovers such a *lick*, as such places are there called, he reckons himself sure of obtaining plenty of game, by lying in wait near it, and, shooting them as they approach it, until the whole beasts that have discovered it are killed.

It is also admitted by all those who have tried the experiment, that salt, given along with the food of domestic animals, [except fowls, to which salt is a certain poison,] tends very much to promote their health and accelerate their feeding; and although some persons, who have been at a loss to account for the manner in which this stimulant could act as a nutritious substance, have affected to disregard this fact, yet no one has been able to bring the slightest shew of evidence, to invalidate the strong proofs that have been adduced in support of it; though, unfortunately for this country, few experiments of this kind have been tried in it. In fact, we have no reason to suppose that salt acts in the smallest degree, as a nutritious substance, or, *of itself*, tends to fatten any animal; but that merely, by acting as a condiment, it whets the appetite, and gives the creature to which it is properly administered a strong relish for its proper food, so as to induce it to eat *in a given time* a greater quantity than it would have done, and thus greatly to aug-

ment, as has been above explained, it's feeding quality beyond what it otherwise could have had. In this way, it is not perhaps an extravagant position to say, that by a proper use of common salt, the same quantity of forage might, on many occasions, be made to go twice as far as it could have gone in feeding animals, had the salt been withheld from them. If so, (and let those, who are inclined to withhold their assent to this position, prove, by a set of experiments fairly conducted, that it is erroneous; till then, the unvarying testimony of the few who have tried it, confirming the position, ought to be relied on. If so, then, I still say,) we have here laid open to our view an easy mode of augmenting the produce of our fields to an amazing extent: for, if the same quantity of forage can be made to go, not twice as far, but *one twentieth* part only farther than it now does, it would be the same thing as adding one twentieth part to the aggregate produce of meat for beasts, throughout the whole kingdom. But, according to the estimate of the president of the Board of Agriculture, there are upwards of fifty millions of acres of *cultivated* land in this island; the value of that forage produced by which cannot, on an average, be rated so low as twenty shillings *per* acre; but even at that low rate, the

the addition of one twentieth would amount to 2,550,000*l. per annum*; a sum so great, that when viewed in the aggregate, it is difficult to bring the mind to believe that such an improvement is actually practicable; yet, when the particulars are considered in detail, it seems to be impossible not to admit that the amount of the improvement must be greatly above what is here stated.

This improvement, however, *immense* as it must appear to be, in whatever way it can be viewed, is entirely prevented from taking place in this island, by reason of the salt laws: for while these shall be continued on the footing they now stand, it is vain to think ever to induce farmers even to try the experiments that are necessary for elucidating the facts here wanted: and other persons are, for obvious reasons, incapable of making the experiments; nor, if they could make them with the utmost accuracy, could they ever convince farmers in general, while the duties shall be allowed to continue as they now are, so far as to induce them to make a copious use of salt for their beasts in their general practice. Considered under this point of view, as well as many others, the duty on salt must be accounted one of the most impolitic taxes that

ever was imposed in any country ; as it tends to retard the prosperity of the nation in a thousand ways, to an amount that no person, who has not considered the subject with the same attention I have done, could ever believe to be possible.— Better were it for the inhabitants of this country to pay an hundred times the amount of the free produce of the duties on salt, if levied in any one of a variety of ways that might easily be suggested, which do not bind up the hands of industry as this does. But so long as party cabals shall occupy the minds of the leading men in the legislative and executive departments of government, to the exclusion of every object from their serious thoughts, that cannot be immediately connected with them, it is in vain to think that observations which tend to promote merely useful measures, which might perhaps affect the interest, and tend to disgust some powerful supporters of either party, or their adherents, will ever command the attention of any party. I write then, at present, as in times past, without hope, and merely from a sense of duty. I am happy in being placed beyond the verge of the vortex of any party whatever, otherwise I also might perhaps have been induced, like others, to leave this subject untouched, as well as some others

that in a similar manner retard the prosperity of the nation, and which are equally respected alike by those who are in power, and those who hope to be so (*r*).

Hay, best mode of obtaining it of a fine quality.—Hitherto I have treated only of green forage; but as in this climate, where grass does not continue to vegetate luxuriantly throughout the whole year, a provision must be made for winter food for beasts; for this purpose, it becomes necessary, in all cases, on grass farms, to appropriate a proportion of the land for hay. It becomes, then, a consideration of some importance, to enquire in what way hay of the best quality can be obtained in the greatest quantity, and at the least expence that the nature of the case will admit.

From the consideration above stated, it is evident that it is a matter of much greater consequence than has been generally imagined, to take care that the hay shall be of the very best *quality* possible; because one stone of hay, of an exceeding fine quality, may probably go as far in *feeding* beasts, as four of an inferior quality will do. Indeed no hay, but that which is of the very best quality, will *fatten* beasts at all; and

there are very few places in this island, where the farmers are at so much pains in making their hay as to render it so good as to be fit for this purpose. So little attention is in general bestowed upon this subject, that few farmers have even an idea of the circumstances that chiefly tend either to improve the quality of their hay, or to make it worse. For the most part, all that seems to be aimed at, is to get the grass as quickly dried as possible, so as that it may admit of being kept, when put up in a large mass together.— And as grass, that is already withered before it be cut, can be more easily dried than that which is very green and succulent, it is too general a practice to allow it to advance too far before it be cut; in consequence of which, the hay is rendered of a quality much inferior to what it might have been. Some light will be thrown on this branch of our subject by the following facts stated by Mr. Davies, in his account of Wiltshire.

“ The dairy farmers,” he observes, “ in North
“ Wiltshire, and in particular the graziers, are
“ much more attentive to the quality, than the
“ quantity of their hay. It has been already
“ remarked, that they make a point of haining
“ up their meadows as early as possible in au-

“ turnn, and of course are able to mow early in
“ the summer.

“ It is not uncommon to see grafs mown,
“ not only before it is in blossom, but even be-
“ fore it is *all in ear*; and to this it is owing
“ that it is more common to fatten cattle with
“ *hay alone*, in North Wilts, than perhaps in
“ any county in the kingdom.

“ And by this the dairy men are able to keep
“ up the milk of those cows that calve early,
“ and from which calves are fatted, which
“ would otherwise shrink before the springing
“ of the grafs, and never recover. And the ad-
“ vantage they get by early after-grafs, and by
“ the duration of that after-grafs to a late period
“ in autumn, fully compensates for the loss of
“ quantity in their hay crop.”

These observations are judicious; but they do not go as far as could be wished. Nothing is said as to the mode adopted for *winning* the hay (*s*) on which it's quality must always greatly depend. It is in general understood, that if hay can be made so as to retain some tinge of it's green colour, it is better than if it were bleached white, or rotted: but precautions are seldom thought necessary to be adopted for guarding against the effects of scorching sun-shine, which

by too quickly exhaling its natural juices, renders it sticky, brittle, and unpalatable to a certain degree; and, what is of still more importance, the effects of rain, or even dew, if abundant, if they be suffered to fall upon the grass after it is cut, and before it be made into hay, are seldom adverted to; so that if dry weather come soon to exhale that wet, while the grass lies spread out upon the ground, the farmer feels little anxiety about the consequences; though it is a certain fact that no hay, which has been in the least wetted during the process of hay-making, can ever be made to have that sweet palatable taste it would have had without it. Nor did I ever see it fail that beasts, when allowed to choose between hay so made, and that which has been carefully guarded from moisture, ever hesitated to make choice of the last, or committed a mistake, even where I myself could not distinguish a perceptible difference. By precautions that I myself have adopted, and which are mentioned in the essay on hay-making, in the first volume of these essays, this evil may be in a great measure obviated; but even under that process, the surface of the hay-cocks cannot be protected from dew or rain; so that if wet weather shall come on during the hay pro-

cess, a very large proportion of the hay must sustain a damage that greatly diminishes its value. To guard against this inconvenience, and to obtain hay, in all cases, of the very best quality the circumstances will admit of, the following process may be safely conjoined with the practice of cutting and feeding beasts with grass in the house, above recommended.

If the produce of grass land be to be cut, as above described, and used green, it will be proper, in general, to reserve a part of it for hay: in this case the cutting for *grass* and for *hay* should be carried on together; but with the following variations, depending on the uses it is to be applied to. That part of the grass which is intended to be used green, as it will suffer no damage by being cut when wet, must continue to be cut regularly each day as it is wanted, without regard to the weather; whereas that part of it which is intended for hay, ought on no account to be cut while wet; and therefore that part of the operation must be discontinued unless when the weather is dry and fine; nor should grass that is intended for hay ever be cut either in the morning, or the evening, while dew is upon it. And as the hay, in the mode proposed, ought to be made day by day for a conti-

nuance, as the grafs comes forward for the fcythe, while the weather is in a proper ftate for it ; and not all at one time, as in the ufual mode of hay-making, the cutting both grafs and hay from the fame field may be very economically combined together. For this purpofe, the grafs which is cut in the morning, while the dew may perhaps be upon it, and in the afternoon, ought to be appropriated to the beafts green ; and that part of the grafs only, which is cut from about nine till two o'clock, while the weather is dry and fine, fhould be made into hay. If the mower begins to cut down for hay about nine o'clock in the morning, and goes on in that operation till one or two o'clock in the afternoon, and if the perfons who are to put up the hay begin to that operation about one, the grafs will thus be allowed to lie between three and four hours in the fwathe, expofed to the fun, which will exhale fome part of it's moiſture, and deaden it enough for the purpofes required, though it ftill retains the whole of its nutritious juices without abatement.

After being allowed to lie thus long, it fhould be raked clean up, and carried off the field in the fame cart that is employed for taking in the grafs, and immediately put into the ſtack,

so as that the whole grafs that was cut that day shall be put up before evening; and thus regularly each good day throughout the season.

But as grafs, while in this green and succulent state, would not keep if put up by itself, care must be taken to provide some dry forage to mix with it. For this purpose nothing can be so proper as good dry hay; but for want of that, at the beginning, good straw may be very safely employed. (*t*)

To perform this operation properly, it will be necessary to erect a permanent roof for the hay-stack, supported by upright posts of a proper height. This practice will be highly economical in every sense; not only because it will save the waste of thatch every year, and the labour of putting it on and securing it upon the hay-stack, but also because it will save from damage a great proportion of hay, which is unavoidably wasted in consequence of the imperfection of that kind of temporary thatching. Nothing, I conceive, but inattention, or the aversion that landlords have to erect proper buildings, or the want of security to encourage farmers to do it, could ever have reconciled the nation to the idea of securing hay by the imperfect protection of a temporary roof. Almost the only hay-stack, proper-

ly so called, I have ever yet seen with a *permanent* roof, is belonging to J. Bayley, Esq. at Hope near Manchester, which is one of many judicious improvements adopted by that public-spirited gentleman.

Nor need this roof cost the farmer almost any extra expence beyond what he must have laid out for his proper accommodation in other respects: for if the bottom of the hay-stack be made to rest upon beams supported so far above the ground, as to admit of his domestic animals to stand under them, the same roof will answer both purposes at once, as is done at present with dwelling houses of several stages.

When the hay-stack is to be made up, a wooden gangway of a few loose deals should be laid along from end to end of the whole stack, about six feet above the surface of the floor; a platform on the same level for receiving the hay, should be connected with it. By means of this gangway, a thin stratum of dry hay should be first strewed lightly above the bottom floor; [It will be necessary, in all cases where cattle are put below this hay-stack, not only to have a floor, but also to have the beams lathed below and plaistered, not only for the purpose of preventing fire, but also for preserving the beams

from rotting by the breath of the beasts.] and above that a stratum of grafs should be strewed in the same light manner without trampling upon it; and so on over the whole length of the hay-stack. If the extent of this stack be properly proportioned to the quantity of hay to be daily cut, it may be so contrived as that no more than one (or perhaps occasionally two) very thin strata shall have occasion to be thus made in any one day. In which case the new cut grafs will be exposed to the sun and drying air, for the best part of one day more, before it be covered up, without danger of being damaged either by dew or rain. [To render this kind of hay-stack perfectly compleat, the sides of it might be covered with open deals, set shelving like a tanner's dry house, which would admit the air without sun-shine, and totally exclude rain even during windy weather.] Another stratum of hay and grafs being, in the same manner, laid upon this next day, will prevent it from being ever afterwards exposed to the sun, and will at the same time press it gently down, but still so lightly as to allow the air to pass through it, and gradually exhale its moisture. Each successive addition will press that below it a little more firmly, so as to make it slowly to consoli-

date below in proportion as it dries. Thus will the whole of the native juices of the hay be retained in as great perfection as can be conceived possible, without danger of having it either musty, in any case, (for musty hay is always occasioned by extraneous wet,) or over-heated: and I have not a doubt, that if hay were thus made by the intermixture of dried hay of the same sort with the fresh grass, it would prove as nutritious and fattening for beasts, (perhaps more so, (*u*),) as the fresh grass would be; while the quantity obtained from the same extent of land, would be greater than can be got by any mode of management hitherto adopted.

To render it practicable to strew the hay in this manner quite equally over the whole surface of the stack, the reader will easily perceive that the gangway must admit of being shifted more or less towards one or the other side, as occasion may require; and also, that when the hay rises so high as nearly to touch it, the platform shall admit of being raised a stage higher. This, he will easily perceive, can all be effected without inconvenience, by making the gangway of loose deals, to be supported by light moveable bars, running across the stack, the ends of which rest upon bars fixed to the uprights that

support the roof, horizontally along the side of the stack, at the height of six feet above each other. All this will be so plain, by one moment's reflection, as to require no farther illustration here.

When the hay rises so high as to touch the eaves of the roof, it may be allowed to subside for some weeks, during which time it will have sunk a good deal, so as to admit of more being put upon it; after which, being allowed to settle once more, it may receive a fresh addition; and so on till it be filled choak-full up to the roof, the last additions being introduced by the end, the person treading on the hay in the middle, and squeezing it lightly before him, when he comes to the end to fill up the whole of the triangular cavity of the roof as full as may be. As there can be here no pressure from above, there will be no danger of it's not drying sufficiently: or, if it be a corn farm, the hay-stack may be allowed to settle till the corn harvest; and at that time the vacuity at top may be filled up with corn instead of hay. This will be a great conveniency to the farmer in a ticklish harvest: for as he will be able to put up the corn without pressing it close, and as there will be little pressure upon it in this situation, he will be

able to inn his corn long before it could admit of it in any other situation.

It may perhaps be deemed a digression in this place, but I cannot omit the occasion that here offers, to take notice of the benefits that the farmer might derive from the practice, were it universally adopted, of putting up all his corns, as well as hay, under permanent roofs, constructed on the general plan of that recommended for the hay-stack. The expence would be trifling at first, and the saving afterwards very great, as well as the accommodation it would afford. It would, in fact, be only heightening the roofs of the houses he ought necessarily to have upon the farm, so as to admit of placing the corn above the beasts, and shades for utensils, &c. he must have at any rate, for no walls would be necessary to that part where the corn is to be kept.

If this plan were to be adopted, it might be effected in the following manner. Let a row of posts be placed perpendicularly on each side of the building where the walls should be, at the distance of six feet from each other; these posts resting below on the floor, and supporting at top the platform on which the couples for the roof are to stand, which will bind them firmly. Place then another row of perpendicular posts at

six feet from each other, *across* the building, directly from side to side, in a line between the two outside pillars. The top of these inner posts to be fastened to the girder, (or, as it is called in Scotland, the *balk*) that joins the under part of the couples; and the roof being put on, and properly secured, the building is finished.

This structure being in readiness, and the corn supposed to be ripe before it is reaped, and dry cut down, it may be carried home the same day, and built up with safety in the following manner:

For ever purpose, and in whatever way the corn has been reaped, I am satisfied it ought to be bound up into sheaves before it is led, if economy be aimed at; and the neater these sheaves are done up the better: for the expediting the loading and unloading, and the saving the waste that would accrue by shaking, and while carrying it about loose in forking, will always do much more than pay for the expence of binding it up, even where the corn has been cut down by the scythe; (a slovenly practice, however, which cannot, I am satisfied, from actual experiment actually made, be in any case adviseable, where all *items* are fairly taken into the account.) Supposing it then to be in sheaves, begin to build it up in the corn shade, by laying a row of sheaves

with the butt end outwards, right across the shade in a line with one of the rows of posts; and another row of sheaves in the same manner in a line with the next row of posts, laying the tops of the sheaves towards each other. These ought to be laid in by hand loosely, from a scaffold on each side, and not trod upon. The points of some of the sheaves will reach to the butts of the others, and they will pack thus quite well. A row of sheaves is then to be laid across these, so as that the length of the sheaf lies *across* the building. The butts of the sheaves of this row should be placed first on the outside, and then another row of sheaves should be placed, in the same direction, overlapping the points of the former, and so far from the side, as that the middle of these sheaves shall be opposite to the first post; and on the other side of it another row reversed, so as that the points of the one sheaf lie towards and intermix with the points of the others; and so on across the whole building, in rows, with the butt ends of one row of sheaves to the butt ends of another, leaving a small space between them for the circulation of the air. Above these should be laid another stratum of sheaves across these, in the same direction as the first; and so on, crossing

each other in alternate layers, the whole way till it reaches the top.

One division, of six feet in width, being thus finished, another is to be begun, and finished in the same manner, leaving one of the intervals of six feet between the posts free, across the whole structure, and the other filled up alternately throughout the whole.

In this way, the work goes on from day to day, as the harvest advances. The corn is thus secured immediately, as soon as it is cut, from the possibility of receiving damage from bad weather; and being placed high in the open air, in narrow divisions, full of perforations, what sap is in it will be gently evaporated, while the native juices of the plant will be preserved, without danger of heating.

The sheaves being put up loosely, the stack will gradually subside a good deal, in consequence of the pressure from above: and as it will be fit, in most cases, to be packed more closely after a few days, by the time that the whole range of shades are thus filled up, and room wanted for more corn to be put into it, the sheaves that are upon the top of the first division, and which are of course now the driest, ought to be thrown down into the first open division, and regularly laid and

trampled upon, so as to make them firm; until by lowering the one division, and raising the other, they come to be of an equal height; when the operators should proceed to another, and so on gradually to others as they are wanted.

The under part of the shade will now be filled close up, and the top be left quite open, as at first, so as to admit of a similar operation with the former, the first led corn forming now the base, and so on. The latter cut corn may now be put upon the top of it, exactly after the same way with the first; and being high in the air, and not so much pressed by the weight above, it will be more quickly dried. Thus should you proceed, making two or three successive rows, if necessary, until the harvest is finished, and all got in.

For wheat, which is much firmer in the straw than other corn, and generally cleaner and well ripened, less precaution is necessary. The first division may be put up as above described; but it will not be necessary to leave any open divisions for this kind of corn: one division after another can be filled up from the scaffold at one side. In most cases no precautions will be wanted to prevent it from heating; but where it is greener cut than usual, and it appears doubtful if it will keep well, in laying the sheaves lengthwise

across the shade, an opening of a few inches in width may be left in the middle, between two sheaves, all along in the same line right across the whole, which, being covered by the sheaves laid lengthwise across it, will admit a circulation of air: one of these pipes may be made in every second, fourth, or sixth layer, as circumstances shall seem to require.

After this manner, the whole corn of a farm could be perfectly secured against sustaining any damage from the weather in any season; and thus an immense expence on some occasions, and an amazing waste in others, be entirely prevented; while the straw, in every case, would be nearly as good as hay; and the quality of the grain much better than it ever can be, if subjected to rain after it has been reaped: for I have found by experiment, that if grain has ever been wetted from the time it is cut down, it never can be brought to the same state of perfection as it would have had, if it had never been wetted: nor can any art ever make the same corn, if it has been once wetted, shrink into so small a bulk, or become, of course, so weighty as the same corn would have been, if it had been thoroughly *winn*, without having been at all wetted. Nor does barley, that has been wetted and afterwards

dried, ever malt so kindly as it would have done if kept quite dry. This is a fact, I believe, that is not generally known. (v)

For the purpose of *fattening* beasts, it may be necessary to mix the *hay* with the *grass*, but for rearing young beasts, or other purposes, it will be highly economical to make use of *straw* for this purpose: for straw of oats or barley, when thus mixed with *grass*, will be equally good as ordinary hay. If economy were duly studied by farmers, perhaps not one particle of these kinds of straw ought ever to be employed in any other way: nor could the possessor of *corn* farms ever be at a loss for making such an intermixture, as he will find it profitable always to have as much ground under clover, as would be sufficient thus to mix the whole of his straw, if he inclined. If the proportion of wheat straw were more than enough for litter, it may be cut, and profitably applied in the same manner. But men must accustom themselves to regard economical considerations much more than they do at present, before they can bring their minds to bear with patience such disquisitions as the present. Till that time shall come, agriculture must stop far short of attainable perfection in Britain.

I wish to go on.—But the fear of becoming tiresome makes it necessary to curtail: yet I must add, that as so much saving may arise from the proper distribution of buildings; and as this would become an object of much greater importance than it now is, were the system of stall-feeding in summer, as well as in winter, to become universal, a few words on that head may not be deemed superfluous.

On the right construction of farm-buildings.—Whatever diminishes the quantity of labour required of one man, produces a saving to the farmer that will be in proportion to that diminution of labour. In houses ill arranged, and, of course inconvenient, it will require one man to feed and clean from ten to twenty stall-fed cattle, but in houses properly constructed, I have known one man be able to feed and clean fifty head of beasts with great ease. The arrangement which admitted of this economy, was as under. The house was divided by a foot-way of six feet wide, running along the middle from end to end. On each side of it was a range of stalls for cattle, placed with their heads towards each other, of such a length as to admit of twenty-five to stand on a side, which, at three feet for each will give

seventy-five feet. At each end of this walk was a door, by one of which the hay or other dry food was introduced; and at the other turnips or other food recently brought home were laid down, so as not to mix with or foul the hay. Along each side of the walk was placed a wooden trough running the whole length, without interruption, a section of which was of this shape,  the bottom being about six inches wide. Between each beast there was a small division by means of a board, perforated below, and the whole trough was placed in an exact horizontal position, the bottom being raised about six inches from the ground. Behind the troughs were placed the stakes to which the beasts were fastened. The floor on which they stood was paved, sloping a little backwards; and at a length just sufficient to allow the beasts to stand easily and no more, it was lowered at once about three inches, so that the dung which was dropped from the beasts, when they stood right, fell into the lower division. This part of it, and indeed the whole, was made very smooth, so as to admit of the dung being easily swept off by a broad-mouthed flat shovel or rake occasionally, and put into a wheel-barrow as often as was necessary, and thus carried off. The upper part of the structure was supported by strong posts placed at

proper distances, and a passage of three feet left clear behind the cattle. This house had been originally intended to be left open without walls; but as it was found to be too cold for winter feeding, to which it was solely appropriated, the spaces between the pillars had been walled in. For a house to be used the whole year round, it would best answer the purposes of this climate to have these intervals closed in winter, by boards that join to each other quite close, which could be removed during the summer so as to keep the cattle quite cool at that season. At one end of the stalls, where the situation will admit of it, should be a pipe of water, which could by means of a stop cock, be let into the troughs at pleasure. In this way the whole troughs could be filled at pleasure with pure water; and when the beasts had drank as much as they inclined, the water that remained could be let off by opening a plug in the bottom, and carried clear away by a channel prepared for that purpose. In feeding, the attendant fills a barrow properly constructed for that purpose, and wheels it along the middle walk, giving to each beast as he goes along, a small quantity only of that kind of food; and so on till he goes over the whole. As soon as that is eaten up, (or if any part of it remain in

the stall of a particular beast, he takes it first away :) he gives each beast in the same manner, another small quantity of a different kind of food. In this way he goes over them three or four times successively, varying the food at each time if he can; and always reserving to the last the sweetest and most palatable kind of food by way of desert. Then sweep their troughs clean; and if they have got much dry food, especially if salt has been administered, the trough ought to be filled with water, at least four times a-day, which will keep it always sweet and clean, and induce them to eat much more than they otherwise would have done. But if they have abundance of turnips, or other equally succulent food, the water may be administered much more sparingly.

It is not consistent with the plan of this essay, to enter fully into the best mode of fattening beasts; or to specify the kinds of food which answer best to be conjoined with each other; or the way of varying them, so as to produce the most beneficial effects; or the mode of managing the beasts themselves, as to temperature, dressing, &c. or how to choose the food and apportion it to the different ages of the beasts, and circumstances of the case, &c. &c. This would form an ample subject for a separate dissertation. I may, how-

ever, here specify one singular fact, that refers immediately to the subject of this essay, which lays open a wide field of enquiry to the attentive farmer.

Noxious plants may be converted into nourishing food.—There are some of the products of our fields which are not only not useful, but highly noxious to the farmer; as, instead of nourishing his beasts, they prove actually poisonous to such beasts as accidentally taste them. The following fact will shew, that had the enquiry above specified been duly made, some of these might be rendered highly nutritious.

No plant common in Britain is a more certain poison to domestic graminivorous quadrupeds than the common yew tree, (*Taxus Baccata*;) and many are the instances of cattle, horses, and sheep, being killed, which have accidentally tasted of it's leaves and young twigs. Yet it is a very surprising fact, that in the province of Hesse in Germany, where hedges of this tree abound, the peasants are in the custom of feeding their cattle through the winter with the tender shoots of that tree, cut down from their hedges for that purpose, which they find a very excellent and nourishing food at a season of the year when

other sorts of succulent food cannot be easily obtained.

This singular fact having come to the knowledge of Professor Wiborg, of Copenhagen, he at first was inclined to think that the common opinion, that the yew tree is a poison to animals, was unfounded: but experiments soon satisfied him, to his cost, that it certainly was so. He then suspected that the tree called by that name in Hesse must be something else than the common yew; and he determined to take a journey thither to ascertain this fact. He found it was the common yew tree; and, by experiments he there made, he also found that it proved equally poisonous to beasts in Hesse as it had been in Denmark.

He then suspected that he had been misinformed in regard to it's being there used as a food for beasts in winter. But here also he was soon satisfied he had been told only the truth; as the peasants readily allowed that they used it for that purpose every year, and that it made a valuable part of their winter provender.

Surprised at these facts, he then enquired what were the means they employed to destroy it's noxious quality; but to this they could give him no satisfactory answer. All they knew of the mat-

ter was, that they found it necessary, at the beginning of each season, to use it sparingly at first, and to give it to the beasts along with their other food: that they gradually encreased the proportion of yew twigs, which at last came to be a principal part of their food; but that they never kept their beasts entirely on that food alone, but always gave them something else along with it.

At the first he suspected, that, in this case, as is experienced by man in regard to opium, the animal frame gradually became habituated to this drug, so as to admit of it's being taken in much larger doses, in time, with safety, than could have been practicable at the beginning: and willing to make some experiments to ascertain this point, he tried to give it alone in smaller doses than those he had formerly administered, and found to be poisonous; but the beasts he tried refused to eat it by itself in any quantities; so that he began to suspect that the reason of their mixing it with food, at the beginning, in very small quantities, was merely to cover it's taste, which proved disagreeable, till the beasts became habituated to it, when they eat it more readily.

If so, it seemed to him probable, that it's deleterious effects were counteracted merely by the operation upon the animal economy of the other

food that was administered along with it. Convinced of this, by the facts that had been stated to him, he ventured to give, at once, to a horse eight ounces of green yew twigs, (which he had repeatedly found before was a dose sufficient to kill any horse when given by itself,) chopped small, and mixed among twenty ounces of oats. This mixture the horse readily ate up at the first; nor did the smallest symptoms of any disorder appear. This experiment he so often repeated, as fully to ascertain the fact, that when administered in this manner, the yew tree was perfectly innoxious; and that it is solely to the circumstances of it's being always administered along with some kind of dry food in Hesse, and never by itself, that it proves there salutary instead of hurtful.

He has not ascertained whether every kind of dry food for beasts would answer the purpose, or whether it is confined to some particular kinds only: but as the peasants have remarked no peculiarity in this respect, it is probable that any kind common in that country, answers the purpose equally well as others. Neither is it ascertained as yet, what is the smallest proportion of such dry food that will barely serve to render it innoxious; but here, as in every case where ac-

curacy is required, experiments are still wanting.

From this fact we ought to infer, that perhaps there is no plant whatever produced in this country, which may not be employed as food for beasts under a judicious management, though we are as yet ignorant of the way in which any other substances than those we have long been accustomed to use, can be employed with advantage by the farmer.

Sheep may be stall-fed.—Hitherto I have supposed that stall-feeding can only be employed with regard to beasts that have been usually kept in the house; viz. cattle, horses, and swine: but it will be presumed, that sheep must be thrown out of the list of domestic animals, if ever the mode of stall-feeding on green food above recommended, should come into general practice. So far is this, however, from being the case, that I am inclined to believe that if sheep should be fed after this manner, the improvement will be greater on them than any other class of animals. It is true, we have never yet been accustomed to see sheep fastened to a stake, and thus fed by hand, like what has been done with cattle; but this only proves that we have not hi-

thereto considered the subject with the attention it requires, and no more; for I know of no instance where it ever has been tried and proved abortive. It behoves us then to enquire what reasons we have for believing that it would not succeed; and if we can find none which tend to that point, but rather the reverse, we ought at least to suspend our ultimate decision on that point, until the fact shall be clearly ascertained by fair experiment.

We know that the sheep is an animal as gentle in it's nature, and as susceptible of domestication and controul, as any creature whatever; and therefore we have no reason to believe that it would make any violent struggle, or such efforts as might tend to retard it's thriving, if tied up: but much the reverse; for it delights in ease and quiet: so that in this state it would meet with an indulgence, in this respect, entirely suitable to it's nature.

We farther know, that no domestic animal suffers so much from wet as the sheep: for, on account of the thickness of it's fleece, it becomes so weighty, when wet, as to overload the poor creature, so as to oppress it. And as it is long before it can be dried, especially in winter, the animal is chilled by the cold while thus drenched

in wet, so as greatly to retard its thriving. But if the sheep were put into a stall *when dry*, and never suffered to go from under cover to be wetted, it must be totally freed from both of those inconveniences; in consequence of which it could not fail, as one would think, to thrive much better under this mode of management, than that to which it has hitherto been usually subjected.

It may perhaps be alledged, in answer to this, that we do not observe that sheep thrive in general better in those districts, where they are usually put up under cover all night in cots, than in those districts where they are never housed at all, but rather the reverse. I believe, indeed, that they always thrive worse where they are cotted, than where they are suffered always to lie without doors: but this seems not at all to militate against the practice recommended, because the cases differ from each other in an extreme degree. When put up into a cot, while the sheep are yet wet, as must often, indeed usually, be the case in winter, and there stowed very close together, as they usually are in these circumstances, they must soon become extremely hot, and a copious steam arise from their wet skins, under which they must be stewed for the

greatest part of the night : but it is well known that the sheep delights rather in a cold than a hot climate ; and, if it be dry, this animal never seems to enjoy such perfect health as during the coldest weather we ever experience, provided it have at all times abundant food. This kind of stewing heat thus produced can scarcely fail to prove highly detrimental to the creature ; and when it is considered that the vapour that rises from it's own dung, on which, to a great depth, it is usually obliged to lie in these cots, mixes plentifully with the warm aqueous vapour, it can scarcely fail but that diseases of various sorts will be the consequence. Nor is this all : after being stewed all night in this close place, and put into a state of high perspiration, the poor creature is turned out hungry in the morning, perhaps amidst frost and snow, which soon freezes the water in it's fleece, stops all the pores in the skin, suddenly checks all perspiration, and chills the poor creature almost to death during the whole day. Under this kind of management it would be wonderful indeed if diseases innumerable were not the consequence. But where the creature is put up while dry, and is kept continually so, and at rest ever afterwards, in a cool airy place, where it never can

be so much crowded as to suffer any extraordinary degree of variation in regard to heat or cold, and at the same time receives abundance of nourishing food, none of these evils can be experienced; and the diseases which originate from that source can never be expected to appear.

From these considerations, to omit others that might be mentioned, there seems to be good grounds for believing that sheep will admit of being stall-fed with perhaps greater benefit to the person who adopts that mode of management, than that which is to be drawn from any other animal whatever.

Those, then, who would wish to fatten sheep under the system recommended, in preference to other kinds of domestic animals, have no reason to think that they will be under a necessity of laying aside the scythe on that account. It will be easy to contrive low apartments under the hay-ricks, properly divided by stakes and alleys of a proper size, bounded by stakes, as for cattle, of a proportional size, to which the sheep may be fastened, and thus to be regularly fed by hand throughout the season. Whenever the experiment shall be fairly made, it will soon be seen whether it will be attended with as much profit

as we at present have reason to expect; and when this fact is ascertained, the practice may be either continued or abandoned. The person who shall try this experiment, can run no risk of sustaining much damage by it; and as the expence attending it can be but small, it seems to be a very proper object of experimental trial.

On the consumption of turnips by sheep.— Though those branches of the subject I meant to have treated in this essay be not nearly exhausted, I find the volume has swelled to such a size, that it becomes necessary to curtail a good deal. Turnips, however, are an article of such vast importance to the farmer, and the economical modes of consuming them have been so little adverted to, that I cannot omit offering a few short hints, on that head, before I conclude.

There are three modes in which turnips have hitherto been chiefly applied; viz. 1st, consuming them by sheep on the field in which they grew; 2^d, drawing them, and giving them to cattle *in the house*; or, 3^d, drawing them, and giving them to beasts in the field. To these practices I do not object; but there are some circumstances

respecting the management of each, that do not seem as yet to have obtained all the attention they deserve.

In consuming turnips where they grew, by sheep, much waste is incurred over most parts in Britain, by letting them have access to too great a quantity at once. It is not uncommon to hurdle off as much ground, at once, as is intended to keep the sheep for a week at least; and sometimes as much as will serve them four weeks, without moving the hurdles. The sheep have thus at one time too much food; in consequence of which they range at once over the whole, and break, during the first day, almost every turnip in the field, all of which broken turnips begin instantly to rot, so that many of them become in a short while so putrid and stinking, that no creature will taste them, and a large proportion of wholesome food is thus inevitably wasted. Nor is this the only waste sustained by this practice. As the pulp of the turnip is more palatable to the sheep than the rind, they naturally scoop out the pulp from the whole, before they think of eating any more of the rind than is necessary to give them access to the pulp. When the pulp is all consumed, however, they must either eat the rind *alone*, or the whole of it will be lost; so

that the farmer finds himself constrained either to keep his sheep so long upon that part of the turnips, as to compel them through hunger to eat the turnip peel, (in which case the creature must cease to thrive, if not to fall back into a worse condition than before,) or he must resolve to abandon the turnip skins to waste also, although he knows that these, under proper management, are a very wholesome kind of food. A good economist will think it necessary to adopt such a mode of management, as to sustain no sort of waste under this head.

With this view, he will not blindly adopt the notion which seems to be but too common, that turnips can only be beneficially employed for *fattening* of sheep; but he will examine with attention, whether, under certain circumstances, he might not be more benefitted by *rearing* sheep by the aid of turnips than by *fattening* them. Every considerate man knows that the market for fatted sheep is extremely limited, in many remote situations, which are peculiarly adapted for sheep-rearing; but that if he can contrive to keep his breeding sheep always in high condition, he will find abundance of markets for these at good prices, where sheep in worse order could not be sold at all. When turnips were,

first introduced into the remote parts of Britain, they were invariably considered as being in a manner exclusively adapted for the fattening of beasts; and that was the use to which they were solely applied: but, by degrees, experience taught the farmers in some remote situations, that a much greater profit may be derived from applying them to the sustaining of milk cows, and the rearing of young cattle, than to the feeding of them; and these are the uses to which this valuable article is now chiefly applied. But the use of turnips for keeping on a breeding stock of sheep, though it is known in some districts in Britain, is far less generally understood than it deserves to be. By this mode of employing turnips, however, it would seem to be a very easy matter for an attentive economist to avoid the waste above pointed out, and to derive the full benefit from all his turnips with much improvement to his flock.

All that is required for keeping a young stock in a constant state of growth through the whole year round, is to prevent them from ever being stinted for food, especially of the tender and succulent sort. It must happen, however, that during the winter, when the days are short, and the weather severe, very little succulent food of any kind

can be found on the common pastures of sheep; so that they are pinched for hunger, and greatly decline during that season, if they do not die entirely. What is wanted then, is a small addition to their ordinary food, administered so equally throughout the whole winter season, as to give them each day enough to prevent them from sliding, though not so much as to fatten them for the butcher. This will be best done by giving them a snap of turnips each night, that shall in quantity be just sufficient for that purpose, without being so much as to prevent them from seeking and relishing their ordinary food throughout the day. With this view, let us suppose that a row of hurdles is run along one side of a field of turnips, so far only as is just sufficient to allow the whole flock to get access to the turnips with their heads at one time. Let this row of hurdles be moved just so far back every day as to leave access to as many turnips as shall be judged sufficient for this purpose, and no more. The consequence will be, that when the sheep come in from their pastures at night, after having picked up as much through the day as they could there find, they will eat their turnips by way of a desert; and then lie down to repose during the night in a comfortable state, with their bellies full. If the food through-

out the day has been scanty, the turnips will be all eaten up at night, skins and all. If the food has been more abundant, perhaps a few of the skins may be left till the morning, when they will be clean eaten up. In general, it will be adviseable to set off rather fewer turnips at one time than the sheep could easily eat up, in order that none may be wasted. By this practice the sheep will be kept in perfect health and high condition, throughout the whole year, and will grow nearly as much during the winter as the summer months. The ewes in particular will be kept strong and healthy, so as to produce stout lambs, and afford milk in much greater quantities when they yearn, than they otherwise would have done; as is known to be invariably the case with cows that have been kept up by means of turnips during the winter; and being in high health in the spring, the whole flock will advance with the first spurt of early grass, so as to be at all seasons more forward for market, and consequently bring much higher prices than otherwise could have been the case.

By moving the hurdles regularly forward, as proposed, and leaving the field open behind them, the area in which the sheep are confined will become larger every day as the season ad-

vances, so as to give them better room to choose their bed where they find it most convenient. A necessary consequence of this will be, that if the field be uneven in it's surface, the sheep will naturally choose to lie most upon the high and dry patches, which are usually the poorest parts of the field, so that these patches will thus get a more than ordinary share of the dung, which is precisely what they stand in need of to make the crop equal over the whole. To admit of this, it will be proper to begin in all cases at the higher parts of the field, and advance downward to the lowest extremity. But on this, and other particulars of management, equally obvious, it is unnecessary to enlarge.

I shall just hint, because it is not as yet universally known, that where the early grass yielded by watered meadows cannot be obtained, succulent food for keeping sheep on in the months of April or May, till other grass gets up, may always be procured merely by sowing or planting (this kind of turnip admits of being transplanted as easily as colworts,) a proportion of the turnip-field with the swedish turnip, or *ruta бага*, which will keep perfectly succulent till June, if so long wanted; as I myself have often experienced. This kind of turnip does not indeed

grow to so large a size as the common sorts; but it is much more solid, and goes much farther, bulk for bulk, than any of them do. Its flower-stems shoot out as early in the spring as those of other turnips; and they will become as soon sticky, if not adverted to. But where they are to be applied as above, the stems should be cut over before they become sticky, and given either to sheep or cattle. New stems will shoot out in their stead, which will continue tender for a considerable time. In the mean while, the bulb loses none of its succulence, if it should be even allowed to ripen its seeds before it be used; only the skin becomes hard and sticky towards the month of June, at which advanced season it could scarcely be gnawed even by young sheep. But every one knows that, after the beginning of May, there are very few situations in Britain in which grass cannot be obtained in abundance for sustaining sheep, so that it is unnecessary to provide a supply from this plant in *any situation* beyond that period; and in few situations can it be wanted, even so long as that time. It would be improper in me to say more on the culture (which differs in some respects from the common turnip,) of this plant, which is truly a

valuable addition to the farmers catalogue of plants, where the uses of it are properly known.

My limits prevent me from entering on an examination of various other modes of applying turnips, which have hitherto been little adverted to, particularly for dairy cows, which under a judicious management can be fed by them, without affecting the taste of the milk in the smallest degree, and of course requiring no process for removing that taste; and for rearing young horses, to which use turnips can be applied with singular economy, as well as for various other purposes, which the attentive economist will discover when he directs his attention steadily to this subject.

CONCLUSION.

I SHALL not at present proceed farther in this disquisition, though there are many other particulars I did intend to have touched upon. But the volume is already of such a size, and the reader, I fear, so much tired of these (to many) uninteresting details, that I willingly desist from proceeding farther at present. If only a few persons shall be induced, in consequence of what

has been said, to turn their attention to these subjects, who otherwise would not have done it, I shall be satisfied: but it would give me still more pleasure, if I could indulge the hope that, in consequence of these hints, the reader should be induced to think for himself in all cases; to reflect upon the objects he sees; to examine the foundation of popular opinions, and then to draw his own conclusions from the whole. It is thus he will acquire sound knowledge, much better than by relying on the instructions he shall receive from any writer whatever; for there is no proposition in Euclid more certain, than that, in this way, every man may soon become the best, as well as the most pleasing instructor of himself.

THE END OF ESSAY THIRD.

POSTSCRIPT.

Curfory remarks on the corn laws of Great Britain.

I INTENDED to have here made some remarks on the corn laws of Great Britain, and the causes of the high price of grain, on which these laws have had a considerable influence. With that view I omitted treating of them in the 14th section of essay first. But upon digesting my thoughts upon this subject, I found that, before I could elucidate the matter, so as to make it be fully understood, it could not be compressed into a size to admit of being brought within the compass of the present volume; so that I have been forced to abandon the idea of it. This, indeed, becomes the less necessary, now that the very interesting treatise on the corn laws by Mr. Dirom, with the additions to it by Mr. Mackie, have been published. For although, the subject is there taken up under a somewhat different point of view from what I should have done, and seve-

ral particulars that I consider as of great importance, have been in a great measure overlooked by these gentlemen; yet as the conclusions they draw nearly coincide, as far as they go, with my own, I am well pleased to abandon the subject for the present, hoping the public will bestow so much attention to the forcible arguments founded on undeniable facts, brought forward by them, as to pave the way for the observations of other men who may at a future period push their investigations a little farther than they have, perhaps wisely, chosen to do on the present occasion.

Referring then to that treatise for reasons that will satisfy most men, I shall here, with a view not to leave the treatise incomplete in one of its most essential articles, barely state the conclusions I should have been forced to draw on this subject: viz. That the corn laws of Great Britain, as they at present stand, are extremely inadequate for the purposes intended by them: that the principle of them, if any consistent principle can be fairly recognized, is erroneous: that as they at present stand, they neither are, nor have been, nor can be executed: that they are calculated to give rise to jobs, chicancery, and frauds innumerable: that they unnecessarily interrupt the internal commerce of grain, so as to distress the peo-

ple and depresses the agriculture of the nation : that under the pretext of attempting to lower the price of corn, they really enhance it beyond what it ought to have been, and give occasion for the interference of government in innumerable cases, where that interference can only prove hurtful to the public at large, with some other evils, which it would be tiresome here to enumerate.

I am far, however, from agreeing with the ingenious author of the inquiry into the causes of the wealth of nations, in thinking that no corn laws at all are necessary: on the contrary, I believe a judicious system of corn laws would contribute, more than almost any other political regulation, to promote the tranquility and internal prosperity of this nation. This opinion of Dr. Smith I combated soon after the publication of his book. [Observations on Natural Industry, Letter XII. P.S.] He at one time declared, that he did intend to answer it, and took steps to ascertain facts respecting that subject; but afterwards laid the design aside. Most of the facts that he enquired after are now brought forward by the very ingenious writers of the treatise above quoted; and these facts, in the most decisive manner, overturn his theory. I therefore hold it as a point proved, that, in this particular, the judgment of Dr.

Adam Smith, which in many other articles is much to be relied on, had been misled by the fascinating charm of an attachment to a favourite system; and I take notice of it here merely to put the reader upon his guard against being misled by an attachment to that great name, so justly respected in general in this country.

That a well regulated bounty on the exportation of corn, and duty on it's importation, would tend to encourage the agriculture of this country, and to *moderate*, not to enhance, the price of corn, is evident, not only from abstract reasoning, but well-established facts, the reader will be satisfied, if he shall consult the works above quoted. And although the corn laws of Britain, from the revolution, when the bounty on corn was first adopted, till the year 1773, were defective in several essential particulars, so as to operate in a very imperfect manner, compared to what they might have done; yet, even under that defective application of them, and notwithstanding the other discouragements to agriculture, developed in the first essay in the present volume, this nation was found to be capable of not only supplying it's own consumption of corn entirely, but of sparing annually a considerable overplus to other nations. Whereas, since the year 1757, when the

corn laws began to be suspended, and frequently thereafter, till 1773, when the old system was in a great measure abandoned, the manufactures of this country being cherished, advanced into the most flourishing state, while it's agriculture received so severe a check, that the production of corn has been thereby diminished to such a degree, as to force us now to rely on foreign nations for a considerable part of the necessaries of life; and thus the prices have been gradually enhanced. But it was not till the year 1791, when the new *regulating* system was adopted to it's full extent, that the *coup de grace* was given to our corn laws. It is since that time only, that the pernicious consequences of that system have been fully experienced.

It appears, from the tables exhibited in the work referred to, that the average importation and exportation of corn to and from Great Britain for forty years; viz. from the year 1710 to 1750, inclusive, when the original bounty laws were in force, compared with the same average for twenty years, from 1773 to 1793, when the alterations blamed were adopted, were as follow; viz.

506 CURSORY THOUGHTS

Quarters

From 1710 to 1750, the average quantity of grain of all kinds imported into Britain, was *per annum* - - - - 20,976
Ditto exported - - - - - 665,435

Balance *per annum* during this period in favour of Britain - - - - - 644,459

From 1773 to 1793, the average quantities of corn of all sorts imported into Great Britain, was *per annum* - 733,938
Ditto exported - - - - - 303,781

Balance *per annum* during this period against Great Britain - - - - - 430,157

During the first period the exports exceeded the imports - - - - - 644,459

During the last period the imports exceeded the exports - - - - - 430,157

making together - - - - - 1,074,516
being the difference between the produce and the consumption of Great Britain, during an average of years at these two periods.

ON THE CORN LAWS. 507

This singular change of circumstances may be easily accounted for, (without attending to lesser particulars,) merely by adverting to the state of the importation laws during these periods.

During the first period, wheat could not be imported till the price amounted to 53s. 4d.: nor even then under a duty of 16s. *per quarter*; if above that price, and not exceeding 80s. the duty 5s. In the latter period, wheat, when at or above 48s., might be imported, on paying a duty of only 6d. *per quarter*.

Rye, &c. during the first period, when not above 40s. paid a duty of 16s.; if above that price, 4s. *per quarter*.

During the 2d period, if above 32s., the duty was only 3d.

Barley, during the 1st period, when not above 32s. *per quarter*, paid 16s. duty; above that price 2s. 8d.

During the 2d period, when above 24s. the duty was only 2d. *per quarter*.

Oats, during the 1st period, when not above 16s. paid 6s. 5d.; when above 16s. the duty was 1s. 7d. *per quarter*.

During the 2d period, oats, when above 16s. paid a duty of only 2d. *per quarter*.

These alterations were avowedly intended to lower the price of corn in Britain, below the natural standard that the state of this country must fix upon it, in spite of any laws that can ever be made to prevent it; yet, instead of producing that effect, it has unfortunately, though necessarily, happened, that in consequence of the full operation of that system of legislation, which was evidently calculated to make this nation depend upon others for bread corn, the rise of prices, occasioned partly by a necessary diminution in the quantity of corn produced in Britain, but chiefly by spreading an alarm, which under these circumstances is scarcely to be avoided, has been such as to involve the nation in great calamity. Nor have half the evils that will arise from the derangement of economy produced by that cause been as yet experienced. The nation will soon but too severely feel them.

That the alteration in the course of the corn trade is to be attributed chiefly to the state of the corn laws, is evident by inspecting the tables above referred to; for, from the union till the beginning of the year 1757, the corn laws being allowed all that time to remain unchanged, the exportation of corn went on gradually encreasing, while the imports were next to nothing; so as

that, in the year 1750, the exports exceeded the imports by 1,667,459 quarters. In the year 1757 the corn laws were first suspended, and never afterwards were permitted to operate freely. From the moment when these laws were first suspended, the importations began to encrease, and the exportations to decrease, so that in the year 1775, the imports exceeded the exports by 972,400 quarters, making a difference between the quantity of corn produced in this island in the years 1750 and 1775, of no less than 2,679,859 quarters. This difference, amounting to about one fourth part of the average consumption of Great Britain, cannot be attributed to a change of seasons, but to other causes. What the balance will amount to in the years 1795 and 1796, remains yet to be ascertained; but it is easy to perceive that it must be very great.

I do not now enter into the consideration of the corn act 1791, as it would require elucidations far beyond my present limits. I ventured to point out to the public, in the year 1793, in a very concise and cursory manner, a *few*, and but a very few, of the striking absurdities of that law. These animadversions happened to fall in the way of some persons pretty high in administration at the time, who, instead of endeavouring to cor-

510 CURSORY THOUGHTS

rect the glaring absurdities there exposed to view, have only since then expressed their astonishment that any individual should dare to point out errors of legislation with such undisguised freedom as is there done. Since that time, the effects of these laws have been more seriously felt than before; and had I been able to enter at all upon the subject at present, it must have called forth a much more severe tone of indignant reprehension than it produced on that occasion.

That these laws have tended to diminish the production of corn in this island, and to enhance it's average price, and must continue to do so as long as they shall be suffered to exist,—could be easily 'proved, did circumstances admit of it at present: but I am far from attributing the enormous prices that have for so long a time deranged the economy of this nation, entirely to a diminution of the crop, originating either from this or from any other cause. This phenomenon must be ascribed chiefly to political manœuvres of various sorts, arising from circumstances that, when explained, would tend to excite a smile, if it were not checked by a contemplation of the extent of the pernicious influence of effects that have originated from such trifling causes. Among these circumstances, *one* of very great influence

indeed, is, that the subject chanced to attract the notice of the public, towards the close of a parliament, when a general election was expected to take place: for had it happened soon after a general election, when men's minds are in a comparative state of repose, many discussions that have been brought forward with great eagerness by a variety of individuals, would have been passed by with indifference. In that case, a member of parliament, instead of opening, like the leader of a pack of hounds in full cry, on the popular subject of a care for the welfare of the lower orders of the people, with a view to excite their veneration for his character at the next election, would have contented himself with eating his own bread in quietness, and allowing others to do so in the way they pleased, at such prices as they could obtain it for. Nor would others, fearing they might be thrown out at the next general scramble, have found that it was necessary not only to follow, but to try to outdo these first starters by still more violent vociferations. Neither would the minister, with a view to display his parental regard for the flock over which he for the present watches, have thought it incumbent on him, to depart so far from his proper business as to become, like Julius Cæsar, and many other

Cæsars, the dispenser of corn to the people ; and thus to derange the whole system of that domestic economy which ought ever to be preserved, like the apple of the eye, in a well regulated state. No man can have such a mean opinion of the talents of the minister, as to believe he did not perceive this long before the period arrived, when fearing that the great drains upon the treasury, occasioned by this measure, might afterwards be productive of disagreeable consequences to him, he obtained a recommendation from the committee of parliament not to interfere farther in the commerce of corn. Nor will it be credited but that many men of sound understanding in the house of commons, and of all parties who have been emulous which should come most forward in this struggle of apparent humanity, did not perceive at the moment, as well as other sensible men did, that this contest only tended to frustrate the end it *apparently* aimed at, and to enhance the prices of corn to the poor, instead of lowering them. The history of the present period, if ever it shall be developped with the necessary degree of impartiality, intelligence, and precision, will afford one of the most interesting lessons to the political enquirer : for never before was the power of imagination of men, in over-ruling the

practical business of a great nation, in a matter of such serious and universal concern as the price of bread corn, so clearly ascertained; nor could the means that produced this wonderful effect be developed with so much facility and precision. Other instances indeed have occurred, in the present day, of the irresistible power of the imagination of men over practical affairs of the first importance; but it will long remain a matter of much greater difficulty, to trace with precision the causes that led to these astonishing effects.

On the whole, there can be no doubt that this nation possesses the means of abundantly supplying itself with provisions of all sorts, were it's population augmented even to a degree far beyond what is in the contemplation of any person at the present moment, if such measures were not adopted by the legislature, and leading men in the country, as tend to depress that business below the level of other professions that are open to every man in this island; and of course to abstract from agriculture that capital, genius, and industry, which ought to have been appropriated to rural enterprises. Among the measures that would lead to this salutary end, no one could prove of such extensive influence as a system of corn laws grounded on principles that should tend to ensure a

steady market to the farmer, at reasonable prices, under all circumstances. Were such a law made, which should be simple in it's operation, comprehensive in it's influence; and should it be freed from those numerous petty *regulations* that tend to fetter individuals in the management of their own private affairs, which it is so much the spirit of the present day to delight in; and which, as they cannot be executed, give rise to innumerable frauds and evasions that derange the public economy,—render the laws disrespectful in the eyes of sensible men,—perplex the legislators, and occasion those innumerable alterations, under the title of *amendments*, of our laws, which so much disgrace our code; and were this simple efficient law, when once made, to be suffered to operate steadily for a sufficient length of time, no person can form an adequate idea of it's beneficial tendency. But till a set of men can be found, who shall be seriously disposed to enquire with candour into the principles upon which such a law should be constructed, without having a view to any kind of party influence whatever, nothing else can be expected but a series of futile expedients, that are subjected to a state of perpetual fluctuation, the natural tendency of which is to drive us, in time, like ancient Rome, to de-

pend upon other nations for our support. If the experience of past times, the sufferings that we ourselves at present experience, and the derangements that must soon flow from it, do not produce a conviction of the necessity of seriously adverting to this subject, nothing that I could say would prove of any avail. Here, therefore, I conclude,

THE END OF THE THIRD VOLUME.

NOTES

TO VOLUME THE THIRD.

(*a*, Page 48.) THE Reader will here advert to the difference between the law of primogeniture, and the law of *entail*, which, by appropriating the whole property unalienably to one, is productive of the most destructive consequences to a society of men who are engaged in projects of industry.

(*b*, Page 65.) I know no exception to this rule; unless the following practice, which the beneficence of Mr. George Dempster, so well known in this country, suggested to him, be considered as an exception. In an estate in one of the highland counties of Scotland, that lately came into his possession, and on which, as is usual in those districts, there was much uncultivated land, and many persons who had little employment; he, with a view to encourage some industrious exertions on their part, agreed to give full permission to each person, who should settle on any of the waste lands belonging to him, for a cow to go on these; and also to cut fuel in his moor, and to cultivate as much of the land as they should think proper; giving them a perfect security of possession, free from rent, during the natural life of the original settler; and, on the demise of the first settler, a continuation of possession by his heirs for years more, at a rent to be fixed by two neutral persons to be mutually chosen by the parties; with some other small bounties, unnecessary to be here specified: and he has now the satisfaction of seeing a great many small patches of land cultivated along the waste and more coming gradually into culture.

This is a fine object for benevolence to delight in contemplating ; but the unceasing exertions of a beneficent owner are necessary to be continued, or the industry must slacken. In few situations, perhaps none, could the exertions of men in these circumstances be sufficient to maintain their families, even without paying any rent. Where they are furnished with employment so as to enable them to earn as many days wages as they incline, they will be enabled to benefit themselves by their own exertions upon their little field. This employment Mr. Dempster has furnished them, by setting on foot certain manufactures in their neighbourhood for that purpose. The ground, in this case, comes to be cultivated in consequence of the manufactures : and, in a few particular situations, this may become practicable ; but situations of this kind are so rare, and the requisite exertions of the proprietor so great, though, perhaps, under judicious management, not extremely expensive, that its influence must always be confined to such narrow bounds, as scarcely to deserve to be taken into the account as a national object : neither can it be considered as *farming*, in the strict appropriated meaning of the word. All the observations in the text, it is evident, respect land under the management of a *farmer* properly so called.

(c, Page 73.) I am inclined to think, that the general prejudice which prevails among the vulgar against large farms, and rich farmers, may be referred to the same source. In the state of society to which I allude, there were no classes of men who were thought to be entitled to enjoy the advantages to be derived from wealth, but landed proprietors alone : for lands were originally appropriated by the sovereign to those who had distinguished themselves by their military prowess ; and military prowess in those days, being the only criterion of merit, whoever discovered that they possessed that merit in an eminent degree, were immediately invested with lands to exalt them above the vulgar. Witness the

well-known origin of the family of Errol, and many others that are on record. Military prowess was, in those days, deemed a virtue of such an exalted nature, that few among the lower classes could aim at it. And landed chieftains, with their immediate descendants, were suffered to enjoy the glory arising from it, without being envied by their inferiors : but when one of the people themselves acquired, by cultivating the soil, a small degree of wealth above his neighbours of the same class, it roused their envy ; and they all, of course, concurred with the landlord, in wishing to pull down this upstart, who was supposed to have obtained this wealth, not in consequence of a laudable degree of industry, that ought to be encouraged ; but to the unfair bargain he had obtained from the owner of the ground, who conceived that every shilling that such a man acquired, was actually filched, as one might say, from himself ; and that, of course, he had a natural right to resume it, if he could. Nor are these ideas totally obliterated, even till the present hour, either among the owners of land, or the herd of the lower classes, who in general borrow ideas from father to son, through many generations, without the smallest attempt to ascertain whether these be well or ill founded.

(*d*, page 92.) I have seen men of considerable talents, who, from speculative notions of ideal possibilities, have deemed it practicable to devise a lease by which a man, without having any security of a continued possession, in a farm, should be laid under certain restrictions that would prevent him from ever having it in his power to hurt the landlord ; and, at the same time, to bring the farm into as high a degree of productiveness, as it ever could attain under the system proposed. But, though we were to admit, (which I am far from doing) that the thing was *physically* possible, I would still maintain, that it is morally *impracticable* ; seeing no consideration whatever, except a perfect *conviction* of absolute security, can ever induce the farmer to exert himself con-

tinually, and without intermission, to the utmost of his power ; and nothing but a lease, legally certain, can impress this conviction on his mind. I consider that kind of metaphysical refinement in reasoning, which confounds *possibilities*, with things *practicable* by man, as one of the greatest curses that can be introduced into society : and I fear, that here, as well as in other instances, it's effects have been exceedingly baneful among mankind.

(*e*, page 94.) Those who are fond of political calculations may have here full scope for their ingenuity, by supposing that two men, of equal spirit, knowledge and capital, set out in the agricultural line,—one of them as a *farmer* on a lease of the kind here proposed, and the other as a small proprietor, or *Yeoman*. Let the capital be taken any how at random, say 2000*l*. The *Yeoman* we shall say, lays out 1500*l*. of that sum on the purchase of a farm, which, at thirty years purchase, the usual rate at present, would be worth 50*l*. a year ; and he has 500*l*. left for stocking and improving it. The other leased a farm, which, at a fair rent, was worth 200*l*. a year. Let him follow out the calculation,—first in regard to the profits that the different occupiers themselves can enjoy, and the rate at which their families may afford to live ; —and, second, with regard to the augmentation of agricultural produce that each of them could afford to the state ; and let this be continued for the space of an hundred years. Let him then strike the balance, and see what an amazing difference !

(*f*, page 120.) I consider entails, and other such ridiculous attempts to perpetuate a name, as alike impious, impotent, and impolitic, in a state of society like that which prevails at present in Europe, and liable to produce political disorders of the most dangerous sort. Wherever ideas of luxury prevail, and those ideas of personal freedom which alone can give energy to human exertions, entails produce a kind of fetters that are incompatible with these notions, and therefore prove exceedingly galling to a

vast variety of descriptions of men. They ought not perhaps to be tolerated ; but if at all tolerated, it should be under such restrictions, as to mitigate, in some measure, the evils that necessarily originate from them. A wise legislature looks forward to things of this nature ; and, in time, guards against the evils of violent convulsions of any sort, by making customs which have been sanctioned by law, gradually give way to the changes in men's minds and circumstances that are imperceptibly taking place in all stages of civil society.

(*g*, page 137.) Farmers who pay tithe in kind, for the most part, consider those who draw the tithe in the same light nearly that brewers or distillers view the officers of excise ; and the ingenuity of these two descriptions of persons is almost continually on the stretch to discover some way in which they can be cheated : it is easy to perceive, that a person whose wits have been thus exercised from his infancy to discover modes of evasion, will at last acquire a considerable degree of dexterity in it, so as often to foil an honest man, who happens to acquire a right to the tithe. This is an evil whose consequences are of wider extent than I choose to develop at present.

(*h*, page 184.) I cannot produce a more striking proof of this, than occurs in respect to the irrigation of land ; a practice that has been found in the highest degree beneficial in Wiltshire, and several other counties in Britain, where it has been practised as an improvement of the very first consequence for ages. Yet, through the greater parts of the kingdom, it was never heard of till of late ; and in many very extensive districts, the farmers in general know nothing about it, even at this present time. Though there is not a doubt, that were this practice introduced as generally as it might be in every district, the total produce of the island might be augmented by that means alone to the value of many hundred thousand pounds *per annum*.

(*i*, page 229.) For the sake of brevity, I mention *lime* only in the text ; but the same observations will apply to any other calcareous matter, of equal purity, that can be obtained : of these shelly sand, and shell marle, are the most easily divisible, and, where free from extraneous mixtures, are nearly equal in value to lime. Chalk is a pure calcareous matter ; but is not so easily divisible ; and clay marle is often impure, so as to require to be employed in very *large* quantities to produce a sensible effect. All these substances operate nearly in the same manner.

(*k*, page 244.) Perhaps turnips can be reared to a larger size on clayey lands than any other, if merely the rearing them to a greater size were to be adverted to ; of which the following well authenticated fact will afford a sufficient proof. Mr. Campbell of Shawfield occupies a farm at Woodhall, near Glasgow, consisting of a strong clayey soil, upon which he had some turnips last season (crop 1795,) of a size that attracted the notice of every person who saw them. One day an argument having arisen among the gentlemen at table, about the greatest weight to which a turnip could be raised, and opinions varying very much on this subject, Mr. Campbell ordered one of the largest of his turnips to be pulled and weighed. This was done ; and most part of the company were very much surprised on finding that it weighed full *forty* pounds. On searching, however, with great care, through the field at a future period, when they had attained a greater growth, one turnip was found which, when perfectly cleaned from earth and rubbish of any sort, weighed SIXTY THREE POUNDS AND A HALF. This turnip was kept for some time, and repeatedly weighed before different persons ; among the last of whom was the Duke of Argyle, who saw it weighed some weeks after it had been taken up, when it was found to have lost just half a pound ; it weighing then no more than sixty-three pounds neat. Many persons are now alive who saw this turnip weighed, and can correct me, if I

mis-state the fact, which I should not have ventured to give, but upon *the very best authority*; for it is so great, that I am sensible it will occasion some surprise. I record it here with satisfaction, for two reasons; first, because it affords the clearest proof that turnips can be reared well on clayey soils, as I have often experienced; and second, that turnips are reared in Scotland to a larger size in general than perhaps in any other country, as I had ventured to hint at in the agricultural survey of Aberdeenshire, published by the Board of Agriculture.

(*l*, page 244.) Turnips may be carried off even a clayey soil, without poaching it, by the following contrivance. Let the turnips be sown in drills, at a convenient distance for horse-hoeing, say three feet, and let them be properly earthed up for the last time to as great a depth as the plough can go; let care be then taken that no clods be suffered to remain in the bottom of the furrow, to detain the water when rain falls. If this be carefully attended to, the rain will run clear of as soon as it falls; and that wet poachyness, which is frequent on such lands, will be in a great measure prevented. Let no animals of any sort come upon the field after this last hoeing, till the turnips are to be carried off.

Have a cart provided, of the nature of a waggon, having three wheels, two on one end, placed at six feet asunder, and one at the other end, exactly in the middle line of the cart; of course the two first wheels will stretch over two rows, and the wheels go exactly in the outside furrows of these; the other wheel will go in the furrow in the middle that divides the two ridges. This cart may be drawn by one horse, or by two, one before the other; the horses will go in the middle. In this way, neither the horses nor the wheels will touch the plowed land; the cart being introduced at one end, and drawn along the course of the same ridges as far as is necessary for loading the cart. When it is loaded, the horse or horses should be unyoked, (the cart resting as a waggon

on it's wheels,) and turned about, be then yoked at the other end of the cart, and so return in the same tract in which they came. Care should be taken, in general, to draw the loaded cart down the hill, not only because of the easiness of the draught, but also because the wheels will make a clear tract, to serve as a good water furrow afterwards.

(*m*, page 259.) In a practical treatise of this nature, it is impossible to avoid using technical phrases, without employing great circumlocution. But technical phrases are sometimes of a local nature, and in danger of not being generally understood. The words *Tilth* and *Tid* may be of that nature, for which reason they require to be explained.

Tilth has always a reference to the state of the soil respecting manures and culture. When it is richly impregnated with manures, and well divided by means of good culture, it is said to be in good *tilth*; or in bad *tilth*, when the reverse.

Tid has always a reference to the state the soil has been in, chiefly as respecting wetness or dryness at the time of labouring. It has been found by experience, that whatever state ground may be in at a particular time, as to *tilth*, if it be laboured when very wet, or subjected to a deluge of rain, under particular circumstances, immediately after ploughing, the effects of the former good culture will in a great measure be destroyed; and the succeeding crop, which, if this stirring in improper circumstances had been avoided, would have been abundant,—will, in consequence of this circumstance, be very poor. A farmer, in this case, would say, that the land had got a very bad *tid*; or, where the season, when labouring, and immediately after it, was very favourable, he would call it a good *tid*.

(*n*, page 265.) This is the general estimate in those counties where the sheep-fold has been long used. I myself am inclined to think it could not dung so much: on that point I will not dis-

pute. The general conclusion will be the same, whether it be supposed to be above or below the truth. It must vary in different cases.

(o, page 269.) *Ebb* differs from *shallow* in this respect. *Ebb* denotes a small depth in a solid body; *shallow* the same of a fluid. Therefore we say an *ebb* furrow, and a *shallow* pool.

(p, page 355.) Though I think it best in general to obtain young plants from nurseries, and therefore do not in the text enter into the minutiae of raising them from seeds; yet where *very extensive* plantations are to be made, it will be best to raise the young plants. This has been the practice for many years past by the Duke of Athol, who has made more extensive plantations of larch trees than perhaps any other person in Europe: the mode of rearing them at Dunkeld is as follows:

Dunkeld method of raising larches in the nursery.—"A well dug bed in your nursery garden being prepared, three inches deep of the earth must be removed from the surface of the bed, with a spade or the back of a rake: place the earth round the edges of the bed, and beat the bed with the flat spade. In the month of March, or beginning of April, lay the cones very thick and quite close to or covering one another on the bed. About 10 or 14 days, or three weeks, according to the weather, you will find the cones have dropt a great deal of seed on the bed; rake them off, and lay them on another bed prepared in the same manner; then, with the rake, draw the earth over the first bed; proceed in the same manner with the second bed, and you may expect a full crop of larch plants or seedlings:—cover them with straw or shilling-seeds, during winter,—let them remain next summer in the seed bed,—transplant them the following spring or autumn,—when they have been transplanted two summers, plant them out in your plantation ground,—make a small pit for them to loosen the earth, and set them into the hole, replacing the turf, cut in two, and with the earthy side

of it uppermost: no soil suits them better than moors, with a peaty or black mould: the same cones will serve for two or three years.

These instructions I copied, August 1795, from the mouth of one of the Duke of Athol's principal gardeners, and are the most perfect that ever were given, and will be found the most effectual for raising larch nursery." G. D.

To the above I shall only add, that in nurseries, where they are reared in very large quantities for sale, a very different practice is adopted. In these cases, the cones are always split, and the seeds threshed and winnowed: they are sown in a bed of good garden mould, prepared as if for carrots or onions. The seeds are equally sown in the month of April *very thick*; for it is found that, on an average, of the best seeds not more than one in three will germinate, and sometimes a smaller proportion. They are covered with mould directly after sowing, as with onions, and smoothed by a light wooden roller drawn along each bed. The plants appear in a month or six weeks, with the seed husk upon the top, when they must be watched, to drive away birds, which would pick them up very fast, if not guarded continually, while they are coming up: afterwards they require no other care, except to pull up the weeds frequently before they get firm roots: if the season be dry and hot sunshine, it is a great advantage to shade them for some time from the sun by means of mats, otherwise they run a risk of being sometimes wholly killed by it; but in moderate weather, in this climate, they often escape unhurt, though unprotected. In very rich soils some of them may be planted out when only one year old; but for the most part they may be allowed to stand two years in the seed bed, and then be planted where they are to remain. A plant from 6 to 9 inches high, is what I should deem the best for such soils as have not a tendency to produce much grass.

(q, page 388.) I am inclined to think this will be but a very moderate dunging; but I state the facts as they are there stated. Should double the quantity of dung, or more, be required for certain purposes on particular occasions, it will not affect the conclusions deducible from these facts in *kind*, only in *degree*.

(r, page 460.) The duty on salt is in a particular manner to be regretted in Britain; because it enhances the price of this necessary article to a much higher degree than would be experienced in other countries where no salt mines are found. Were it not for this tax, rock salt, without any purification, would answer perfectly well for the use of beasts, and could be afforded to farmers at perhaps one twentieth part of the price of salt at present; but we all know that rock salt dares not be sold in Britain.

Again.—Were the duty on salt taken off, it would be easy to show how the manufacture of salt could be carried on in Britain to an extent that scarcely knows any bound, *without the waste of one particle of fuel*, so as to admit of being sold to foreign nations at a much lower price than it can be had from any other place; while it could also be made of a finer quality than is yet known any where on the globe. Thus would be established an immense trade in salt; which, as a necessary article, could admit of few interruptions; for no other nation is so circumstanced as to have it in their power to become our rivals in this manufacture. It is foreign to my purpose here to state farther particulars, but I pledge myself to do it, if ever properly called upon for that purpose.

(s, page 462.) I am afraid that the phrase, *winning* of hay, is provincial, and may not be generally understood. By *winning*, I mean to denote the process of converting succulent herbage into a state of hay that can be kept in quantities. I intended to have made use of the word *drying*, in this case, but it did not express my meaning. Grass, when wetted by rain, may be dried so as not to feel wet, when it is by no means in the state of hay.

(*t*, page 466.) I once saved a great quantity of clover hay, being a late third cutting, when the season was too far advanced to admit of it's being made in the usual way, by putting it up when new cut, thus intermixed with a large proportion of good straw. It kept perfectly well; and when cut down and given to the beasts, was relished by them better than any other hay I had, and was equally valuable, I ~~am~~ persuaded, for every purpose. This mode of saving a late crop of clover is by no means uncommon.

(*u*, page 469.) No hay has yet been seen that is equally fattening as succulent grass. I believe hay thus made would be more so, because it's native juices would be fully retained, and only it's superfluous moisture be drawn off; and that this watery juice is more hurtful, is proved by experience; for every grazier knows that, in a dry season, when that moisture is exhaled from the grass, his beasts fatten much faster than in a rainy season, when it continues fully succulent; although the herbage upon the field be, in this last case, far more abundant.

(*v*, page 477.) The method recommended in the text for housing corn, is extremely different from that which is pretty generally adopted in England, where *large* barns are in use. In particular, it admits of taking down any part of the corn that shall be first wanted, wherever it is placed; for, as any one of the six feet divisions can be taken down without affecting the others, it allows the most perfect freedom in this respect. Whereas, the mows in a large barn can only be taken down in the exact form they have been originally put up. The danger of a large mow heating in the barn is thus also entirely obviated.

END OF THE NOTES TO VOLUME THIRD.



